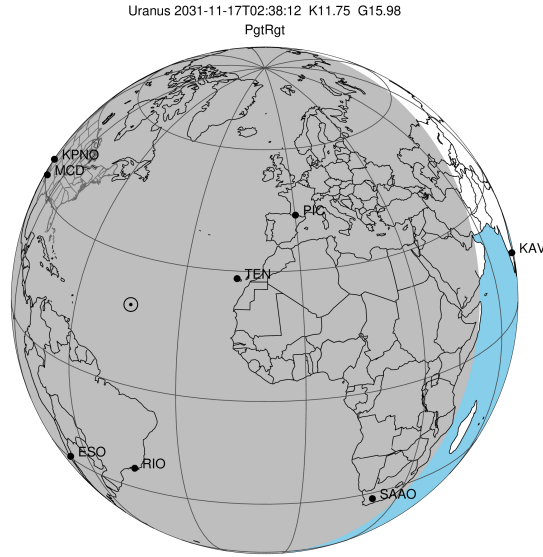


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-11-17T02:38:12.120
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3428383018979444480
 2Mass ID (if available) : 05422838+2331271

ICRS Star Coord at Epoch: 05h 42m 28.38875s +23:31:27.15768s

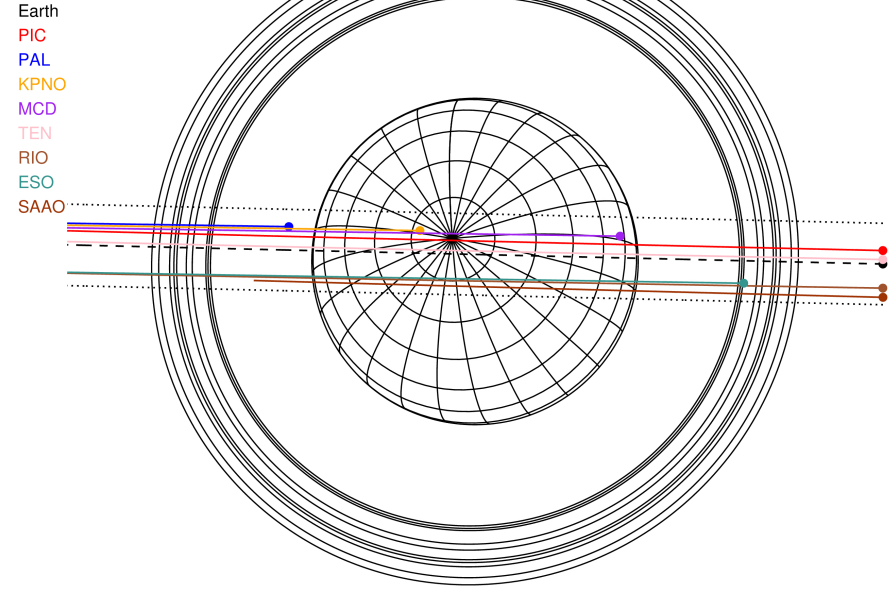
RUWE (>1.4 is poor) : 1.00
 K magnitude : 11.754
 G magnitude : 15.982
 RP magnitude : 14.838
 BP magnitude : 17.353
 DUPflag : 0
 Distance (au) : 18.246
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.96
 Sun-Target sep (deg) : 148.11
 Sun-Moon sep (deg) : 176.11
 B (ring opening deg) : 78.56
 PA of pole (deg) : 44.65

#	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



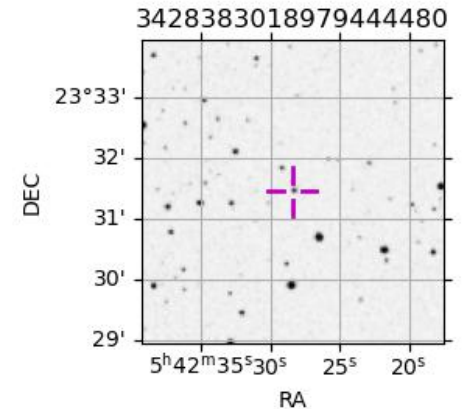
2031-11-17T02:38:12.1200 ra: 05 42 28.3887 s: +23 31 27.158 C/A 0.0911 PA 178.67 deg v_sky -18.96 km/s D 18.25 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2031-11-17T02:38:12 K11.75 G15.98 PgtRgt



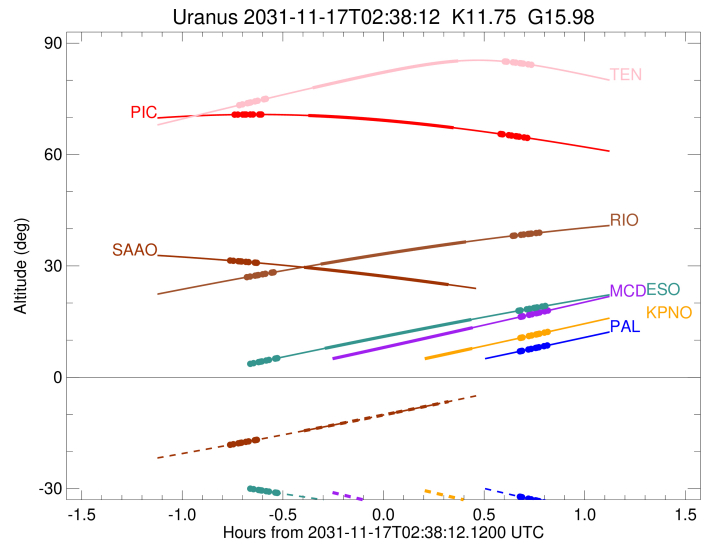
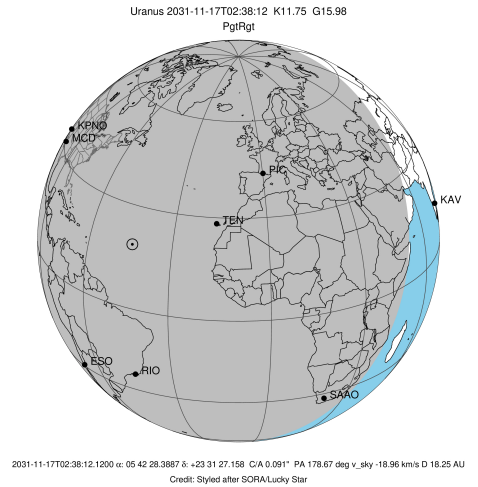
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	NOV 17 01:53 - NOV 17 03:21	PieRie
PAL	Palomar Mt (200")	33.4	243.1			+++++	NOV 17 03:18 - NOV 17 03:26	PnnRne
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4		+	+++++	NOV 17 03:04 - NOV 17 03:27	PneRne
MCD	McDonald Obs. 2.7m	30.7	256.0		+	+++++	NOV 17 03:04 - NOV 17 03:27	PneRne
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+ +	+++++	NOV 17 01:55 - NOV 17 03:22	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	+++++	+ +	+++++	NOV 17 01:57 - NOV 17 03:24	PieRie
ESO	European Southern Obs	-29.3	289.3		+++	+++++	NOV 17 02:05 - NOV 17 03:26	PieRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++	+ +		NOV 17 01:52 - NOV 17 02:57	PieRin
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



```

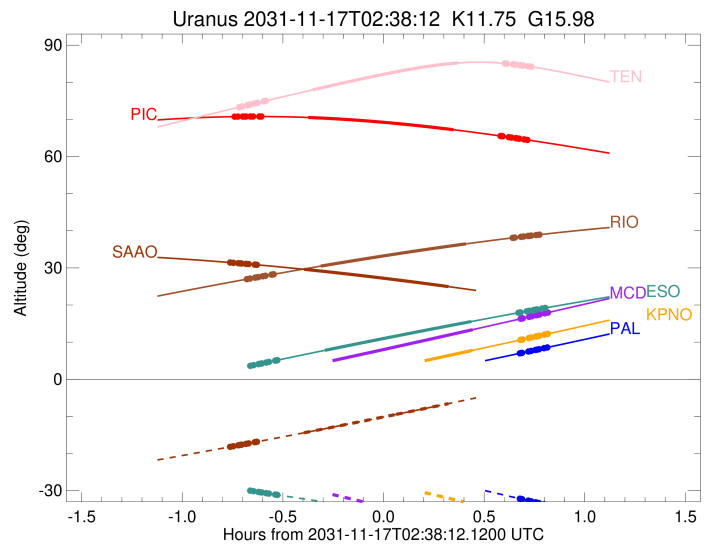
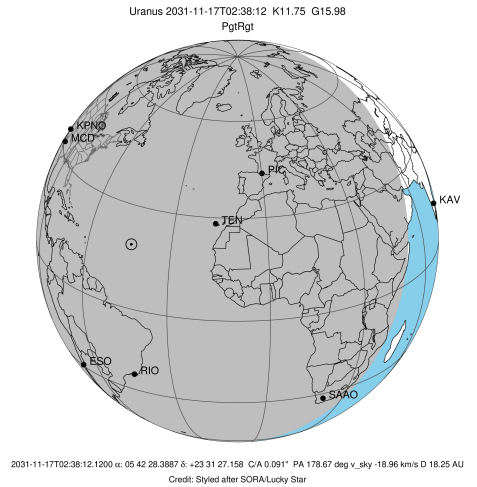
target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-11-17T02:37:29.510
Event type           : PgtRgt
: Ring occs: geocentric, topocentric
Observer code        : PIC
Location             : Pic du Midi
Latitude (deg)       : 42.93656
E. Longitude (deg)   : 0.14231
Altitude (km)        : 2.890
Gaia source ID       : 3428383018979444480
2Mass ID (if available) : 05422838+2331271
ICRS Star Coord at Epoch: 05h 42m 28.38875s +23:31:27.15768s
RUWE (>1.4 is poor) : 1.00
K magnitude           : 11.754
G magnitude           : 15.982
RP magnitude          : 14.838
BP magnitude          : 17.353
DUPflag              : 0
Distance (au)        : 18.246
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -18.96
Sun-Target sep (deg) : 148.11
Sun-Moon sep (deg)   : 176.51
B (ring opening deg) : 78.56
PA of pole (deg)     : 44.65
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.243
C/A sky separation (km) : 3210.3
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.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	2031-11-17T01:53:49.430		70.75	-53.75	51134.75	-19.44		
lambda	I	2031-11-17T01:54:46.404		70.76	-53.60	50026.71	-19.45		
delta	I	2031-11-17T01:56:15.185		70.77	-53.37	48300.35	-19.44		
gamma	I	2031-11-17T01:56:49.603		70.78	-53.28	47631.15	-19.44		
eta	I	2031-11-17T01:57:13.007		70.78	-53.22	47176.12	-19.44		
beta	I	2031-11-17T01:58:30.582		70.79	-53.01	45667.68	-19.44		
alpha	I	2031-11-17T01:59:20.163		70.79	-52.88	44703.03	-19.43		
4	I	2031-11-17T02:01:07.476		70.79	-52.59	42616.55	-19.43		
5	I	2031-11-17T02:01:26.233		70.79	-52.54	42258.82	-19.43		
6	I	2031-11-17T02:01:49.447		70.79	-52.48	41800.15	-19.43		
Uranus	I	2031-11-17T02:15:47.051		70.51	-50.19	25334.16		-7.13	-7.47
Uranus	E	2031-11-17T02:59:04.605		67.22	-42.72	25192.26		9.16	9.59
6	E	2031-11-17T03:13:07.028		65.53	-40.21	41877.14	19.43		
5	E	2031-11-17T03:13:24.376		65.50	-40.16	42223.24	19.43		
4	E	2031-11-17T03:13:40.341		65.46	-40.11	42526.70	19.43		
alpha	E	2031-11-17T03:15:33.664		65.22	-39.77	44729.34	19.43		
beta	E	2031-11-17T03:16:21.067		65.11	-39.63	45651.91	19.44		
eta	E	2031-11-17T03:17:39.462		64.94	-39.40	47176.12	19.44		
gamma	E	2031-11-17T03:18:02.385		64.89	-39.33	47621.73	19.44		
delta	E	2031-11-17T03:18:37.291		64.81	-39.22	48300.35	19.44		
lambda	E	2031-11-17T03:20:06.082		64.61	-38.96	50026.71	19.44		
epsilon	E	2031-11-17T03:21:01.538		64.49	-38.79	51105.09	19.44		

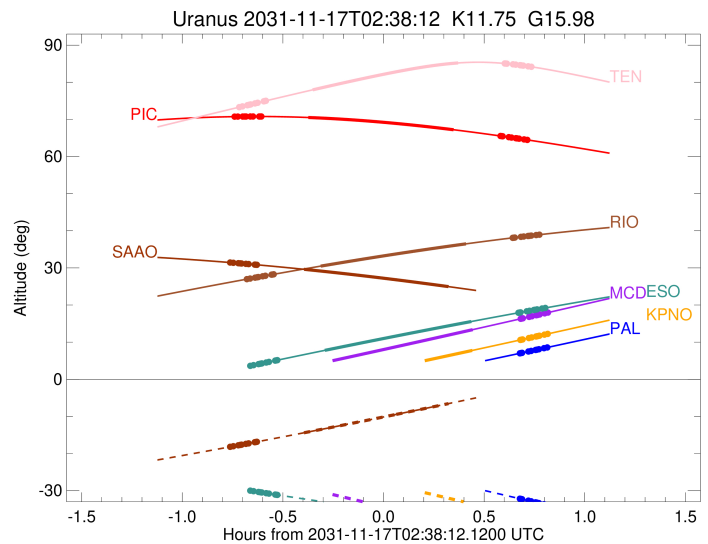
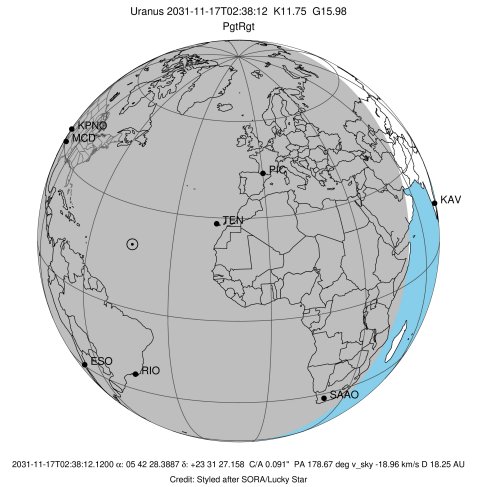
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-11-17T02:42:40.150
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       : 3428383018979444480
2Mass ID (if available) : 05422838+2331271
ICRS Star Coord at Epoch: 05h 42m 28.38875s +23:31:27.15768s
RUWE (>1.4 is poor) : 1.00
K magnitude           : 11.754
G magnitude           : 15.982
RP magnitude          : 14.838
BP magnitude          : 17.353
DUPflag              : 0
Distance (au)        : 18.245
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -18.96
Sun-Target sep (deg) : 148.11
Sun-Moon sep (deg)   : 176.06
B (ring opening deg) : 78.56
PA of pole (deg)     : 44.65
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.378
C/A sky separation (km) : 5003.3
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_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



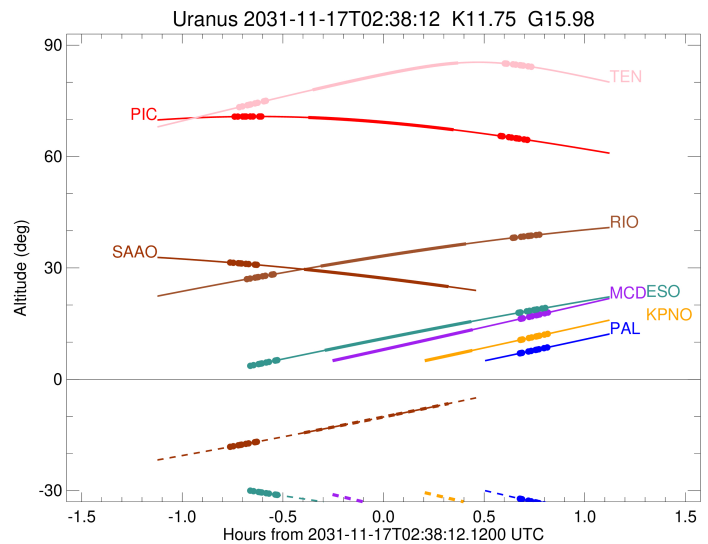
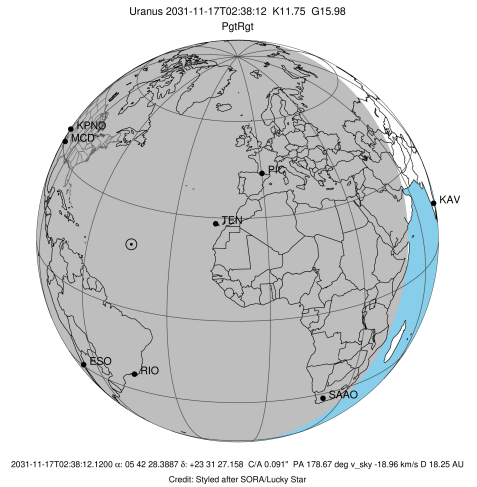
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-11-17T01:57:58.459	-7.82x	-15.42	51117.28	-18.85			
lambda	I	2031-11-17T01:58:56.277	-7.66x	-15.62	50026.71	-18.86			
delta	I	2031-11-17T02:00:27.820	-7.39x	-15.93	48300.35	-18.86			
gamma	I	2031-11-17T02:01:03.308	-7.29x	-16.05	47631.24	-18.85			
eta	I	2031-11-17T02:01:27.448	-7.22x	-16.13	47176.12	-18.85			
beta	I	2031-11-17T02:02:47.501	-6.99x	-16.40	45666.77	-18.85			
alpha	I	2031-11-17T02:03:38.675	-6.84x	-16.58	44701.59	-18.84			
4	I	2031-11-17T02:05:29.298	-6.52x	-16.96	42616.56	-18.83			
5	I	2031-11-17T02:05:48.440	-6.47x	-17.02	42262.68	-18.84			
6	I	2031-11-17T02:06:12.566	-6.40x	-17.10	41801.26	-18.83			
Uranus	I	2031-11-17T02:20:38.574	-3.84x	-20.07	25377.30			-6.40	-6.70
Uranus	E	2031-11-17T03:04:27.132	4.24x	-29.16	25159.25			9.58	10.03
6	E	2031-11-17T03:18:53.571	7.00	-32.18	41877.62	18.96			
5	E	2031-11-17T03:19:11.447	7.05	-32.24	42225.94	18.97			
4	E	2031-11-17T03:19:27.670	7.11	-32.30	42527.01	18.97			
alpha	E	2031-11-17T03:21:23.649	7.48	-32.70	44728.32	18.98			
beta	E	2031-11-17T03:22:12.190	7.63	-32.87	45651.37	18.99			
eta	E	2031-11-17T03:23:32.436	7.89	-33.15	47176.12	19.00			
gamma	E	2031-11-17T03:23:55.889	7.97	-33.23	47621.81	19.00			
delta	E	2031-11-17T03:24:31.589	8.08	-33.36	48300.35	19.01			
lambda	E	2031-11-17T03:26:02.382	8.38	-33.67	50026.71	19.02			
epsilon	E	2031-11-17T03:26:58.517	8.56	-33.87	51094.52	19.01			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-11-17T02:42:50.920
 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 : 3428383018979444480
 2Mass ID (if available) : 05422838+2331271
 ICRS Star Coord at Epoch: 05h 42m 28.38875s +23:31:27.15768s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 11.754
 G magnitude : 15.982
 RP magnitude : 14.838
 BP magnitude : 17.353
 DUPflag : 0
 Distance (au) : 18.245
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.96
 Sun-Target sep (deg) : 148.11
 Sun-Moon sep (deg) : 176.01
 B (ring opening deg) : 78.56
 PA of pole (deg) : 44.65
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.355
 C/A sky separation (km) : 4703.0
 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	2031-11-17T01:58:12.484	-4.83x	-19.53	51119.53	-18.89			
lambda	I	2031-11-17T01:59:10.293	-4.65x	-19.74	50026.71	-18.90			
delta	I	2031-11-17T02:00:41.631	-4.38x	-20.05	48300.35	-18.90			
gamma	I	2031-11-17T02:01:17.038	-4.27x	-20.18	47631.22	-18.90			
eta	I	2031-11-17T02:01:41.123	-4.19x	-20.26	47176.12	-18.90			
beta	I	2031-11-17T02:03:00.983	-3.95x	-20.54	45666.89	-18.89			
alpha	I	2031-11-17T02:03:52.030	-3.80x	-20.72	44701.78	-18.89			
4	I	2031-11-17T02:05:42.395	-3.46x	-21.10	42616.56	-18.88			
5	I	2031-11-17T02:06:01.518	-3.40x	-21.17	42262.16	-18.88			
6	I	2031-11-17T02:06:25.560	-3.33x	-21.25	41801.10	-18.88			
Uranus	I	2031-11-17T02:20:48.904	-0.66x	-24.28	25371.10			-6.51	-6.82
Uranus	E	2031-11-17T03:04:38.979	7.76	-33.55	25165.62			9.50	9.94
6	E	2031-11-17T03:19:02.521	10.60	-36.61	41877.52	19.01			
5	E	2031-11-17T03:19:20.325	10.66	-36.67	42225.35	19.02			
4	E	2031-11-17T03:19:36.532	10.71	-36.73	42526.94	19.02			
alpha	E	2031-11-17T03:21:32.216	11.10	-37.14	44728.55	19.03			
beta	E	2031-11-17T03:22:20.624	11.26	-37.31	45651.49	19.04			
eta	E	2031-11-17T03:23:40.656	11.52	-37.59	47176.12	19.05			
gamma	E	2031-11-17T03:24:04.048	11.60	-37.67	47621.79	19.05			
delta	E	2031-11-17T03:24:39.658	11.72	-37.80	48300.35	19.06			
lambda	E	2031-11-17T03:26:10.223	12.02	-38.12	50026.71	19.07			
epsilon	E	2031-11-17T03:27:06.350	12.21	-38.32	51097.02	19.06			

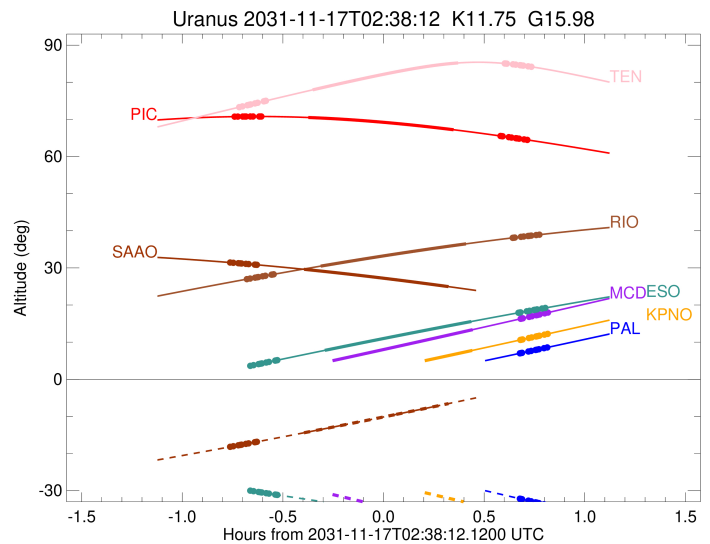
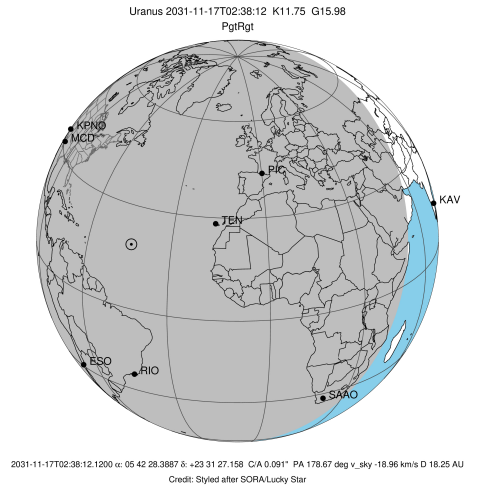
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-11-17T02:42:59.920
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 3428383018979444480
 2Mass ID (if available) : 05422838+2331271
 ICRS Star Coord at Epoch: 05h 42m 28.38875s +23:31:27.15768s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 11.754
 G magnitude : 15.982
 RP magnitude : 14.838
 BP magnitude : 17.353
 DUPflag : 0
 Distance (au) : 18.245
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.96
 Sun-Target sep (deg) : 148.11
 Sun-Moon sep (deg) : 175.95
 B (ring opening deg) : 78.56
 PA of pole (deg) : 44.65
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.326
 C/A sky separation (km) : 4310.8
 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_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	2031-11-17T01:58:27.021	0.23x	-25.79	51122.52	-18.95			
lambda	I	2031-11-17T01:59:24.799	0.41x	-25.99	50026.71	-18.97			
delta	I	2031-11-17T02:00:55.832	0.71x	-26.32	48300.35	-18.96			
gamma	I	2031-11-17T02:01:31.120	0.82x	-26.44	47631.21	-18.96			
eta	I	2031-11-17T02:01:55.122	0.90x	-26.53	47176.12	-18.96			
beta	I	2031-11-17T02:03:14.699	1.15x	-26.81	45667.05	-18.96			
alpha	I	2031-11-17T02:04:05.563	1.31x	-26.99	44702.04	-18.95			
4	I	2031-11-17T02:05:55.548	1.67x	-27.38	42616.57	-18.95			
5	I	2031-11-17T02:06:14.640	1.73x	-27.45	42261.48	-18.95			
6	I	2031-11-17T02:06:38.564	1.81x	-27.54	41800.90	-18.94			
Uranus	I	2031-11-17T02:20:58.180	4.60x	-30.61	25362.89	-6.65		-6.97	
Uranus	E	2031-11-17T03:04:48.570	13.37	-40.04	25173.95	9.40		9.83	
6	E	2031-11-17T03:19:08.167	16.30	-43.13	41877.39	19.09			
5	E	2031-11-17T03:19:25.873	16.36	-43.19	42224.58	19.09			
4	E	2031-11-17T03:19:42.056	16.41	-43.25	42526.84	19.09			
alpha	E	2031-11-17T03:21:37.324	16.81	-43.66	44728.84	19.10			
beta	E	2031-11-17T03:22:25.548	16.97	-43.83	45651.65	19.11			
eta	E	2031-11-17T03:23:45.280	17.25	-44.12	47176.12	19.12			
gamma	E	2031-11-17T03:24:08.588	17.33	-44.20	47621.77	19.12			
delta	E	2031-11-17T03:24:44.071	17.45	-44.33	48300.35	19.13			
lambda	E	2031-11-17T03:26:14.315	17.76	-44.65	50026.71	19.13			
epsilon	E	2031-11-17T03:27:10.413	17.95	-44.86	51100.23	19.13			

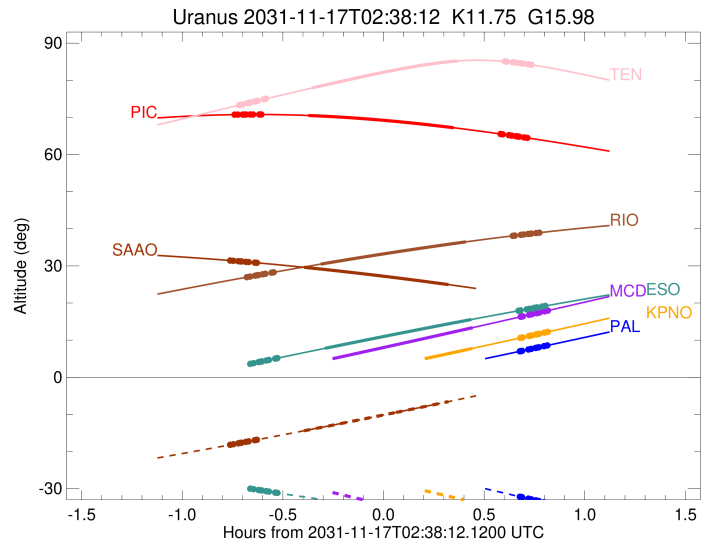
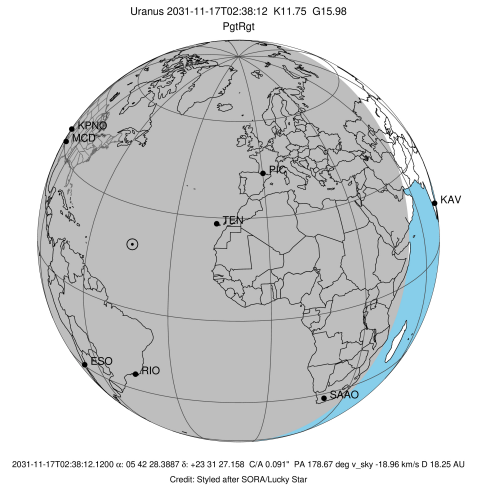
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-11-17T02:38:47.470
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       : 3428383018979444480
2Mass ID (if available) : 05422838+2331271
ICRS Star Coord at Epoch: 05h 42m 28.38875s +23:31:27.15768s
RUWE (>1.4 is poor) : 1.00
K magnitude          : 11.754
G magnitude          : 15.982
RP magnitude         : 14.838
BP magnitude         : 17.353
DUPflag             : 0
Distance (au)        : 18.246
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -18.96
Sun-Target sep (deg) : 148.11
Sun-Moon sep (deg)   : 176.19
B (ring opening deg) : 78.56
PA of pole (deg)     : 44.65
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.124
C/A sky separation (km) : 1645.5
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.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
  
```



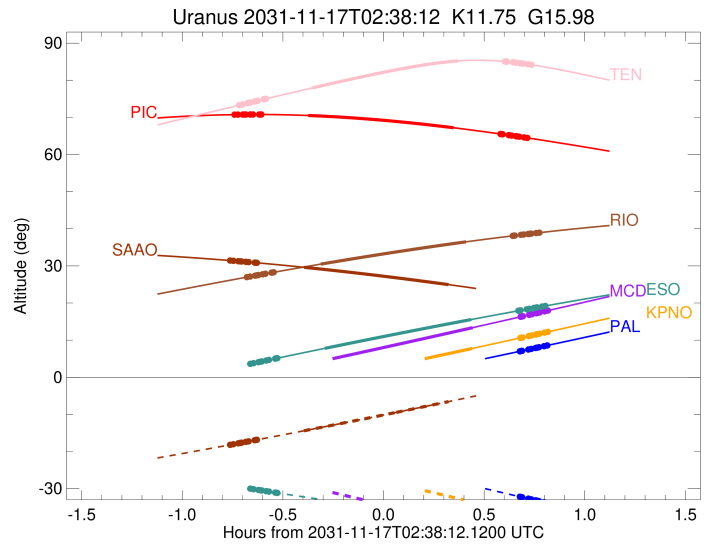
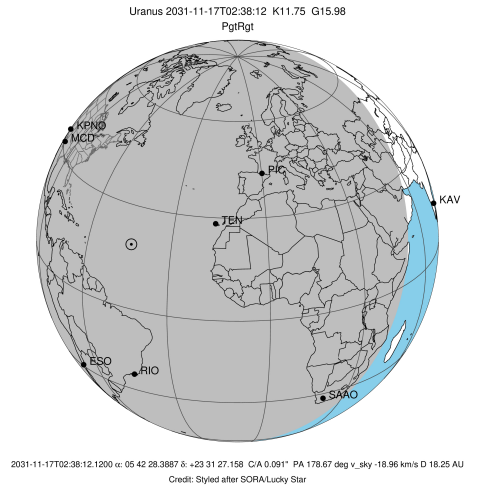
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-11-17T01:55:12.470		73.30	-72.61	51146.34	-19.52		
lambda	I	2031-11-17T01:56:09.813		73.51	-72.43	50026.71	-19.53		
delta	I	2031-11-17T01:57:38.230		73.83	-72.14	48300.35	-19.53		
gamma	I	2031-11-17T01:58:12.508		73.95	-72.03	47631.08	-19.53		
eta	I	2031-11-17T01:58:35.809		74.04	-71.95	47176.12	-19.53		
beta	I	2031-11-17T01:59:53.015		74.31	-71.70	45668.29	-19.52		
alpha	I	2031-11-17T02:00:42.350		74.49	-71.54	44704.04	-19.52		
4	I	2031-11-17T02:02:29.225		74.87	-71.18	42616.47	-19.52		
5	I	2031-11-17T02:02:48.029		74.94	-71.12	42256.11	-19.53		
6	I	2031-11-17T02:03:11.010		75.02	-71.04	41799.43	-19.52		
Uranus	I	2031-11-17T02:17:03.279		77.96	-68.23	25300.86		-7.65	-8.01
Uranus	E	2031-11-17T03:00:27.238		85.21	-58.99	25227.42		8.70	9.11
6	E	2031-11-17T03:14:22.913		85.07	-55.96	41876.52	19.55		
5	E	2031-11-17T03:14:40.036		85.04	-55.90	42220.11	19.56		
4	E	2031-11-17T03:14:56.045		85.02	-55.84	42526.41	19.55		
alpha	E	2031-11-17T03:16:48.712		84.84	-55.43	44730.54	19.56		
beta	E	2031-11-17T03:17:35.794		84.76	-55.26	45652.57	19.56		
eta	E	2031-11-17T03:18:53.667		84.61	-54.98	47176.12	19.56		
gamma	E	2031-11-17T03:19:16.444		84.57	-54.89	47621.63	19.56		
delta	E	2031-11-17T03:19:51.141		84.50	-54.77	48300.35	19.56		
lambda	E	2031-11-17T03:21:19.392		84.31	-54.44	50026.71	19.56		
epsilon	E	2031-11-17T03:22:15.197		84.18	-54.24	51118.42	19.56		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-11-17T02:41:04.990
 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 : 3428383018979444480
 2Mass ID (if available) : 05422838+2331271
 ICRS Star Coord at Epoch: 05h 42m 28.38875s +23:31:27.15768s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 11.754
 G magnitude : 15.982
 RP magnitude : 14.838
 BP magnitude : 17.353
 DUPflag : 0
 Distance (au) : 18.245
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.96
 Sun-Target sep (deg) : 148.11
 Sun-Moon sep (deg) : 175.33
 B (ring opening deg) : 78.56
 PA of pole (deg) : 44.65
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.231
 C/A sky separation (km) : 3058.0
 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



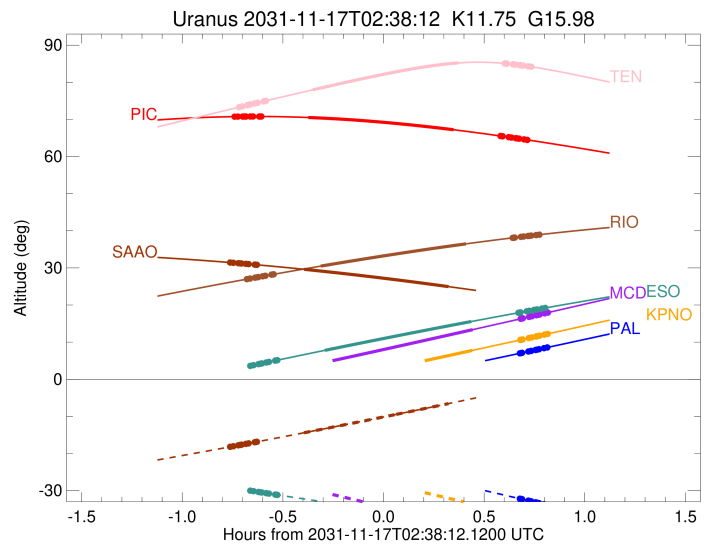
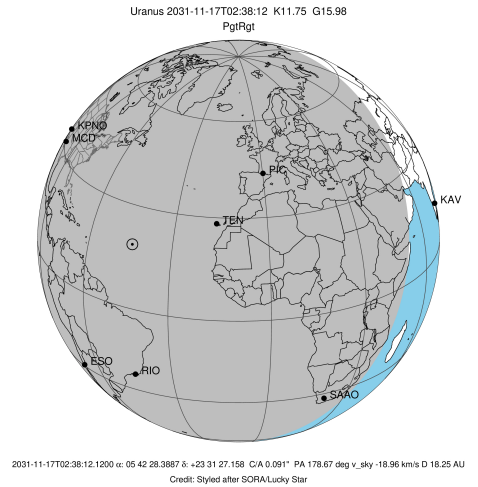
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-11-17T01:57:27.079		26.97	-47.21	51182.57	-19.42		
lambda	I	2031-11-17T01:58:26.617		27.13	-47.26	50026.71	-19.41		
delta	I	2031-11-17T01:59:55.544		27.38	-47.34	48300.35	-19.41		
gamma	I	2031-11-17T02:00:30.032		27.47	-47.37	47630.84	-19.41		
eta	I	2031-11-17T02:00:53.457		27.53	-47.39	47176.12	-19.41		
beta	I	2031-11-17T02:02:11.020		27.74	-47.46	45670.14	-19.41		
alpha	I	2031-11-17T02:03:00.561		27.88	-47.50	44707.26	-19.41		
4	I	2031-11-17T02:04:48.284		28.17	-47.58	42615.90	-19.41		
5	I	2031-11-17T02:05:07.609		28.22	-47.60	42247.57	-19.41		
6	I	2031-11-17T02:05:30.336		28.28	-47.61	41797.53	-19.40		
Uranus	I	2031-11-17T02:19:28.992		30.48	-48.11	25199.12		-9.08	-9.50
Uranus	E	2031-11-17T03:02:46.223		36.48	-47.89	25333.75		7.14	7.47
6	E	2031-11-17T03:16:45.015		38.10	-47.26	41874.35	19.49		
5	E	2031-11-17T03:17:01.894		38.13	-47.24	42211.07	19.50		
4	E	2031-11-17T03:17:18.391		38.16	-47.23	42525.95	19.50		
alpha	E	2031-11-17T03:19:11.566		38.37	-47.12	44733.95	19.50		
beta	E	2031-11-17T03:19:58.716		38.45	-47.08	45654.58	19.51		
eta	E	2031-11-17T03:21:16.686		38.59	-47.00	47176.12	19.51		
gamma	E	2031-11-17T03:21:39.506		38.63	-46.98	47621.39	19.51		
delta	E	2031-11-17T03:22:14.299		38.69	-46.94	48300.35	19.51		
lambda	E	2031-11-17T03:23:42.752		38.85	-46.85	50026.71	19.52		
epsilon	E	2031-11-17T03:24:40.688		38.95	-46.79	51157.66	19.53		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-11-17T02:42:30.250
 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 : 3428383018979444480
 2Mass ID (if available) : 05422838+2331271
 ICRS Star Coord at Epoch: 05h 42m 28.38875s +23:31:27.15768s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 11.754
 G magnitude : 15.982
 RP magnitude : 14.838
 BP magnitude : 17.353
 DUPflag : 0
 Distance (au) : 18.245
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.96
 Sun-Target sep (deg) : 148.11
 Sun-Moon sep (deg) : 175.19
 B (ring opening deg) : 78.56
 PA of pole (deg) : 44.65
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.207
 C/A sky separation (km) : 2744.5
 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_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	2031-11-17T01:58:28.122		3.61x	-30.00	51179.25	-19.25		
lambda	I	2031-11-17T01:59:28.021		3.80x	-30.15	50026.71	-19.24		
delta	I	2031-11-17T02:00:57.742		4.09x	-30.36	48300.35	-19.24		
gamma	I	2031-11-17T02:01:32.535		4.20x	-30.44	47630.86	-19.24		
eta	I	2031-11-17T02:01:56.168		4.27x	-30.50	47176.12	-19.24		
beta	I	2031-11-17T02:03:14.424		4.52x	-30.68	45669.98	-19.24		
alpha	I	2031-11-17T02:04:04.408		4.68x	-30.80	44706.97	-19.24		
4	I	2031-11-17T02:05:53.049		5.02	-31.06	42615.97	-19.24		
5	I	2031-11-17T02:06:12.507		5.08	-31.10	42248.33	-19.24		
6	I	2031-11-17T02:06:35.466		5.15	-31.16	41797.68	-19.24		
Uranus	I	2031-11-17T02:20:40.898		7.78	-33.05	25207.09		-8.97	-9.39
Uranus	E	2031-11-17T03:04:23.359		15.56	-37.96	25328.25		7.23	7.57
6	E	2031-11-17T03:18:27.658		17.91	-39.17	41874.46	19.36		
5	E	2031-11-17T03:18:44.661		17.96	-39.19	42211.45	19.37		
4	E	2031-11-17T03:19:01.248		18.01	-39.21	42525.96	19.37		
alpha	E	2031-11-17T03:20:55.167		18.32	-39.36	44733.81	19.38		
beta	E	2031-11-17T03:21:42.632		18.45	-39.42	45654.50	19.38		
eta	E	2031-11-17T03:23:01.122		18.66	-39.52	47176.12	19.38		
gamma	E	2031-11-17T03:23:24.093		18.72	-39.55	47621.40	19.39		
delta	E	2031-11-17T03:23:59.115		18.82	-39.59	48300.35	19.39		
lambda	E	2031-11-17T03:25:28.151		19.06	-39.70	50026.71	19.39		
epsilon	E	2031-11-17T03:26:26.392		19.21	-39.77	51156.20	19.40		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-11-17T02:35:57.370
 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 : 3428383018979444480
 2Mass ID (if available) : 05422838+2331271
 ICRS Star Coord at Epoch: 05h 42m 28.38875s +23:31:27.15768s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 11.754
 G magnitude : 15.982
 RP magnitude : 14.838
 BP magnitude : 17.353
 DUPflag : 0
 Distance (au) : 18.246
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.96
 Sun-Target sep (deg) : 148.11
 Sun-Moon sep (deg) : 175.66
 B (ring opening deg) : 78.56
 PA of pole (deg) : 44.65
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.297
 C/A sky separation (km) : 3933.6
 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_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	2031-11-17T01:52:26.851		31.45	-18.20	51193.09	-19.47		
lambda	I	2031-11-17T01:53:26.792		31.37	-18.03	50026.71	-19.46		
delta	I	2031-11-17T01:54:55.530		31.26	-17.79	48300.35	-19.45		
gamma	I	2031-11-17T01:55:29.955		31.22	-17.69	47630.76	-19.45		
eta	I	2031-11-17T01:55:53.332		31.19	-17.62	47176.12	-19.45		
beta	I	2031-11-17T01:57:10.735		31.09	-17.40	45670.64	-19.44		
alpha	I	2031-11-17T01:58:00.174		31.03	-17.26	44708.18	-19.44		
4	I	2031-11-17T01:59:47.820		30.88	-16.96	42615.65	-19.43		
5	I	2031-11-17T02:00:07.228		30.86	-16.90	42245.21	-19.43		
6	I	2031-11-17T02:00:29.821		30.83	-16.84	41797.10	-19.42		
Uranus	I	2031-11-17T02:14:29.276		29.62	-14.41	25175.75		-9.37	-9.81
Uranus	E	2031-11-17T02:57:35.432		24.96	-6.56	25348.03		6.91	7.23
6	E	2031-11-17T03:11:39.462		23.16	-3.89x	41874.09	19.38		
5	E	2031-11-17T03:11:56.412		23.12	-3.83x	42210.12	19.38		
4	E	2031-11-17T03:12:13.052		23.09	-3.78x	42525.94	19.38		
alpha	E	2031-11-17T03:14:06.906		22.83	-3.42x	44734.28	19.39		
beta	E	2031-11-17T03:14:54.328		22.73	-3.27x	45654.78	19.39		
eta	E	2031-11-17T03:16:12.747		22.55	-3.01x	47176.12	19.40		
gamma	E	2031-11-17T03:16:35.701		22.50	-2.94x	47621.37	19.40		
delta	E	2031-11-17T03:17:10.701		22.42	-2.83x	48300.35	19.40		
lambda	E	2031-11-17T03:18:39.681		22.22	-2.54x	50026.71	19.40		
epsilon	E	2031-11-17T03:19:38.143		22.09	-2.35x	51161.13	19.42		