

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-11-07T23:58:35.440
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3428374394684939648
 2Mass ID (if available) : 05434404+2331494

Uranus 2031-11-07T23:58:35 K13.62 G17.35 PgtRgt

ICRS Star Coord at Epoch: 05h 43m 44.04296s +23:31:49.25118s

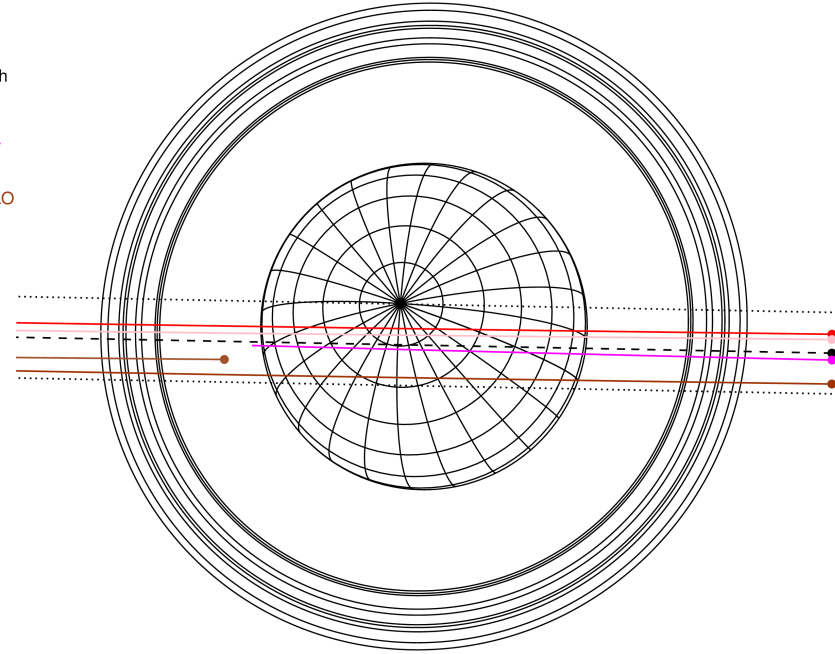
RUWE (>1.4 is poor) : 0.98
 K magnitude : 13.620
 G magnitude : 17.347
 RP magnitude : 16.303
 BP magnitude : 18.437
 DUPflag : 0
 Distance (au) : 18.339
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.01
 Sun-Target sep (deg) : 138.66
 Sun-Moon sep (deg) : 56.56
 B (ring opening deg) : 78.35
 PA of pole (deg) : 45.75

Uranus 2031-11-07T23:58:35 K13.62 G17.35
 PgtRgt



2031-11-07T23:58:35.4400 ra: 05 43 44.0430 cr: +23 31 49.251 C/A 0.213° PA 358.88 deg v_sky -16.01 km/s D 18.34 AU
 Credit: Styled after SORA/Lucky Star

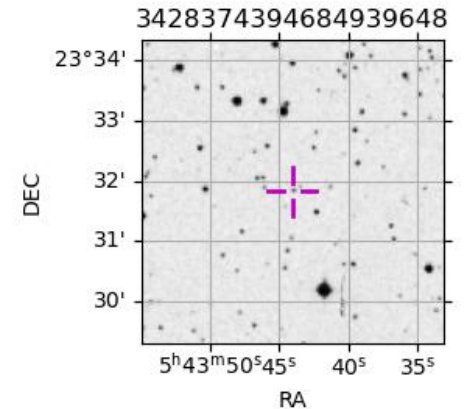
Earth
 PIC
 TEN
 KAV
 RIO
 SAAO



#	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

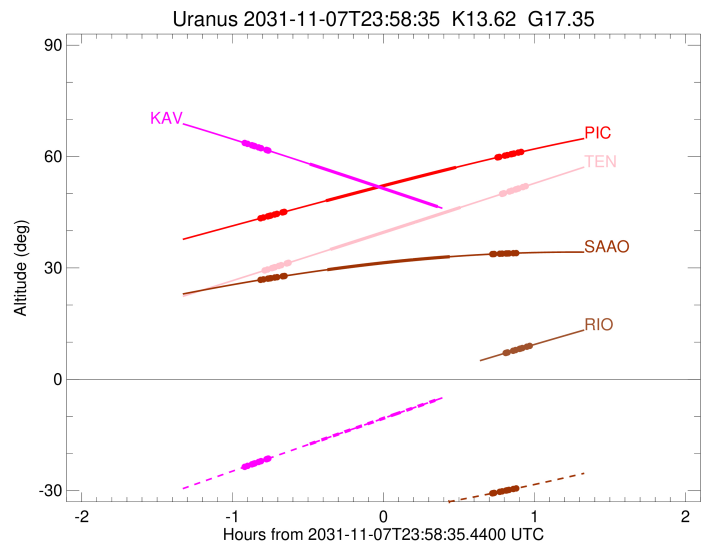
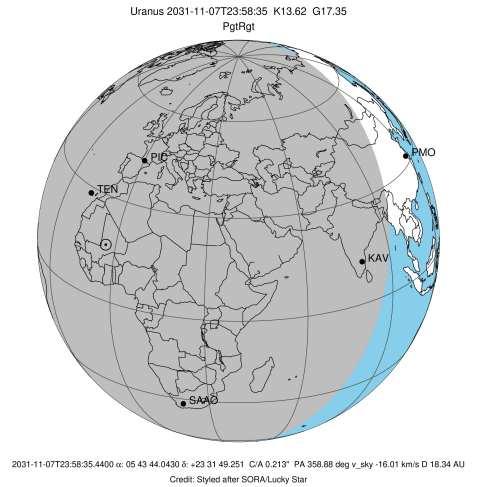
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	NOV 07 23:09 - NOV 08 00:53	PieRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+ +	+++++	NOV 07 23:11 - NOV 08 00:55	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +		NOV 07 23:03 - NOV 08 00:20	PieRin
RIO	Rio de Janeiro	-22.9	316.8			+++++	NOV 08 00:47 - NOV 08 00:56	PnnRne
ESO	European Southern Obs	-29.3	289.3					PnnRnn
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++	+ +	+++++	NOV 07 23:09 - NOV 08 00:51	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



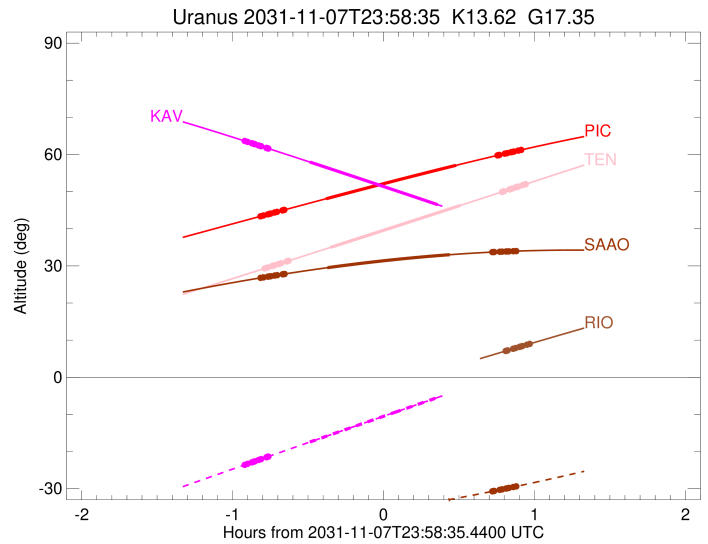
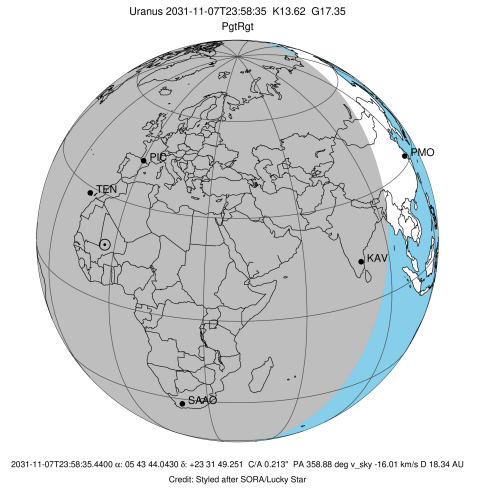
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2031-11-08T00:01:36.210
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       : 3428374394684939648
2Mass ID (if available) : 05434404+2331494
ICRS Star Coord at Epoch: 05h 43m 44.04296s +23:31:49.25118s
RUWE (>1.4 is poor) : 0.98
K magnitude          : 13.620
G magnitude          : 17.347
RP magnitude         : 16.303
BP magnitude         : 18.437
DUPflag             : 0
Distance (au)        : 18.339
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -16.01
Sun-Target sep (deg) : 138.66
Sun-Moon sep (deg)   : 57.41
B (ring opening deg) : 78.35
PA of pole (deg)     : 45.75
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.028
C/A sky separation (km) : 374.1
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
ural11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ural11.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
  
```



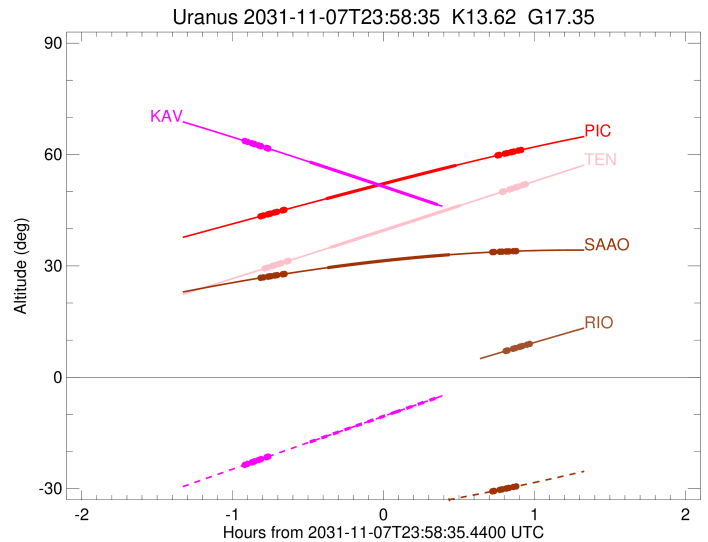
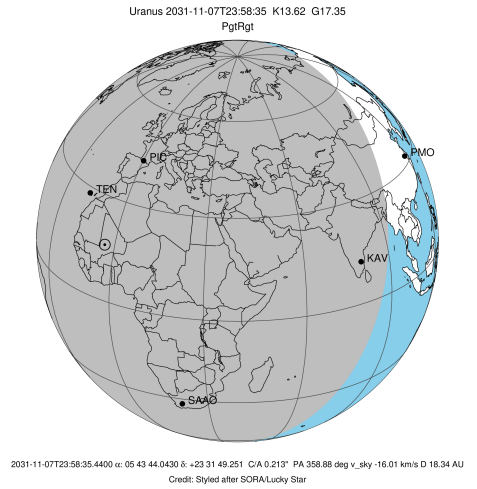
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-11-07T23:09:47.866		43.38	-62.75	51072.69	-16.38		
lambda	I	2031-11-07T23:10:51.709		43.57	-62.80	50026.71	-16.38		
delta	I	2031-11-07T23:12:37.070		43.89	-62.90	48300.35	-16.39		
gamma	I	2031-11-07T23:13:17.888		44.02	-62.93	47631.48	-16.39		
eta	I	2031-11-07T23:13:45.675		44.10	-62.95	47176.12	-16.39		
beta	I	2031-11-07T23:15:18.005		44.38	-63.03	45662.74	-16.39		
alpha	I	2031-11-07T23:16:16.927		44.56	-63.07	44695.44	-16.39		
4	I	2031-11-07T23:18:23.921		44.95	-63.17	42614.44	-16.39		
5	I	2031-11-07T23:18:44.329		45.01	-63.18	42283.50	-16.39		
6	I	2031-11-07T23:19:12.704		45.09	-63.20	41809.85	-16.39		
Uranus	I	2031-11-07T23:35:43.415		48.08	-63.65	25250.16		-8.55	-8.95
Uranus	E	2031-11-08T00:27:27.079		57.09	-62.05	25266.33		8.32	8.70
6	E	2031-11-08T00:43:56.089		59.78	-60.68	41864.14	16.49		
5	E	2031-11-08T00:44:15.061		59.83	-60.65	42185.50	16.50		
4	E	2031-11-08T00:44:36.065		59.88	-60.61	42528.24	16.50		
alpha	E	2031-11-08T00:46:50.280		60.24	-60.40	44741.91	16.50		
beta	E	2031-11-08T00:47:45.817		60.38	-60.31	45659.79	16.50		
eta	E	2031-11-08T00:49:17.695		60.62	-60.16	47176.12	16.50		
gamma	E	2031-11-08T00:49:44.656		60.69	-60.11	47621.05	16.50		
delta	E	2031-11-08T00:50:25.818		60.80	-60.04	48300.35	16.50		
lambda	E	2031-11-08T00:52:10.418		61.07	-59.86	50026.71	16.51		
epsilon	E	2031-11-08T00:53:22.986		61.25	-59.73	51224.53	16.51		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-11-08T00:03:21.140
 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 : 3428374394684939648
 2Mass ID (if available) : 05434404+2331494
 ICRS Star Coord at Epoch: 05h 43m 44.04296s +23:31:49.25118s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 13.620
 G magnitude : 17.347
 RP magnitude : 16.303
 BP magnitude : 18.437
 DUPflag : 0
 Distance (au) : 18.339
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.01
 Sun-Target sep (deg) : 138.66
 Sun-Moon sep (deg) : 57.42
 B (ring opening deg) : 78.35
 PA of pole (deg) : 45.75
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.104
 C/A sky separation (km) : 1386.4
 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_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	2031-11-07T23:11:26.016		29.33	-64.52	51079.53	-16.32		
lambda	I	2031-11-07T23:12:30.532		29.57	-64.74	50026.71	-16.32		
delta	I	2031-11-07T23:14:16.310		29.95	-65.10	48300.35	-16.32		
gamma	I	2031-11-07T23:14:57.290		30.10	-65.24	47631.46	-16.32		
eta	I	2031-11-07T23:15:25.185		30.20	-65.33	47176.12	-16.32		
beta	I	2031-11-07T23:16:57.853		30.53	-65.65	45663.13	-16.33		
alpha	I	2031-11-07T23:17:56.996		30.74	-65.84	44695.94	-16.33		
4	I	2031-11-07T23:20:04.503		31.20	-66.27	42614.72	-16.33		
5	I	2031-11-07T23:20:25.084		31.28	-66.34	42282.12	-16.33		
6	I	2031-11-07T23:20:53.520		31.38	-66.43	41809.15	-16.33		
Uranus	I	2031-11-07T23:37:28.174		34.98	-69.66	25229.49		-8.84	-9.25
Uranus	E	2031-11-08T00:29:13.641		46.31	-77.40	25290.52		7.96	8.33
6	E	2031-11-08T00:45:44.206		49.94	-78.29	41863.22	16.47		
5	E	2031-11-08T00:46:03.160		50.01	-78.29	42183.81	16.48		
4	E	2031-11-08T00:46:24.321		50.09	-78.30	42528.64	16.48		
alpha	E	2031-11-08T00:48:38.676		50.59	-78.32	44742.54	16.48		
beta	E	2031-11-08T00:49:34.260		50.79	-78.32	45660.30	16.49		
eta	E	2031-11-08T00:51:06.183		51.13	-78.32	47176.12	16.49		
gamma	E	2031-11-08T00:51:33.164		51.23	-78.31	47621.02	16.49		
delta	E	2031-11-08T00:52:14.359		51.38	-78.31	48300.35	16.49		
lambda	E	2031-11-08T00:53:59.031		51.76	-78.28	50026.71	16.49		
epsilon	E	2031-11-08T00:55:12.199		52.03	-78.25	51233.68	16.50		

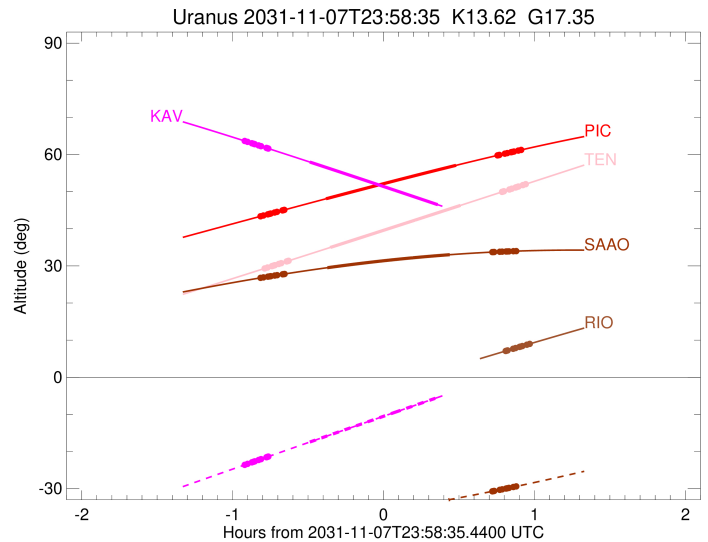
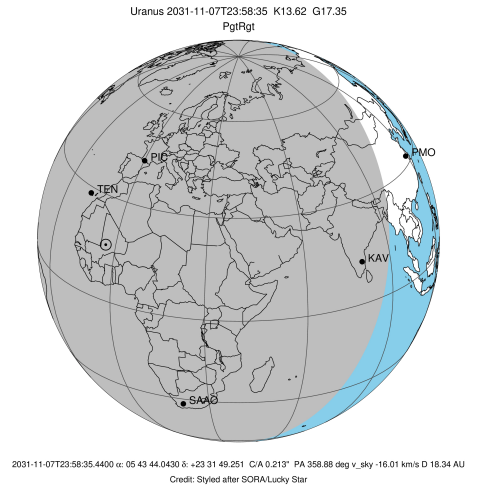
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-11-07T23:54:37.880
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 3428374394684939648
 2Mass ID (if available) : 05434404+2331494
 ICRS Star Coord at Epoch: 05h 43m 44.04296s +23:31:49.25118s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 13.620
 G magnitude : 17.347
 RP magnitude : 16.303
 BP magnitude : 18.437
 DUPflag : 0
 Distance (au) : 18.339
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.01
 Sun-Target sep (deg) : 138.66
 Sun-Moon sep (deg) : 56.85
 B (ring opening deg) : 78.35
 PA of pole (deg) : 45.75
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.277
 C/A sky separation (km) : 3685.5
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-11-07T23:03:28.543		63.64	-23.58	51103.53	-16.56		
lambda	I	2031-11-07T23:04:33.632		63.41	-23.33	50026.71	-16.54		
delta	I	2031-11-07T23:06:18.005		63.03	-22.91	48300.35	-16.54		
gamma	I	2031-11-07T23:06:58.459		62.89	-22.75	47631.38	-16.54		
eta	I	2031-11-07T23:07:25.992		62.79	-22.64	47176.12	-16.53		
beta	I	2031-11-07T23:08:57.420		62.46	-22.28	45664.43	-16.53		
alpha	I	2031-11-07T23:09:55.806		62.24	-22.05	44697.66	-16.53		
4	I	2031-11-07T23:12:01.890		61.79	-21.55	42615.50	-16.52		
5	I	2031-11-07T23:12:22.533		61.71	-21.47	42277.50	-16.52		
6	I	2031-11-07T23:12:50.484		61.61	-21.36	41806.99	-16.51		
Uranus	I	2031-11-07T23:29:17.583		57.98	-17.45	25172.23		-9.60	-10.04
Uranus	E	2031-11-08T00:20:10.389		46.48	-5.43	25332.97		7.29	7.63
6	E	2031-11-08T00:36:43.986		42.70	-1.55x	41861.83	16.43		
5	E	2031-11-08T00:37:02.941		42.62	-1.47x	42181.37	16.44		
4	E	2031-11-08T00:37:24.354		42.54	-1.39x	42529.29	16.44		
alpha	E	2031-11-08T00:39:39.060		42.03	-0.87x	44743.40	16.44		
beta	E	2031-11-08T00:40:34.787		41.82	-0.65x	45661.02	16.44		
eta	E	2031-11-08T00:42:06.913		41.46	-0.29x	47176.12	16.44		
gamma	E	2031-11-08T00:42:33.966		41.36	-0.18x	47621.00	16.44		
delta	E	2031-11-08T00:43:15.276		41.20	-0.02x	48300.35	16.45		
lambda	E	2031-11-08T00:45:00.247		40.80	0.39x	50026.71	16.45		
epsilon	E	2031-11-08T00:46:14.362		40.52	0.67x	51245.69	16.46		

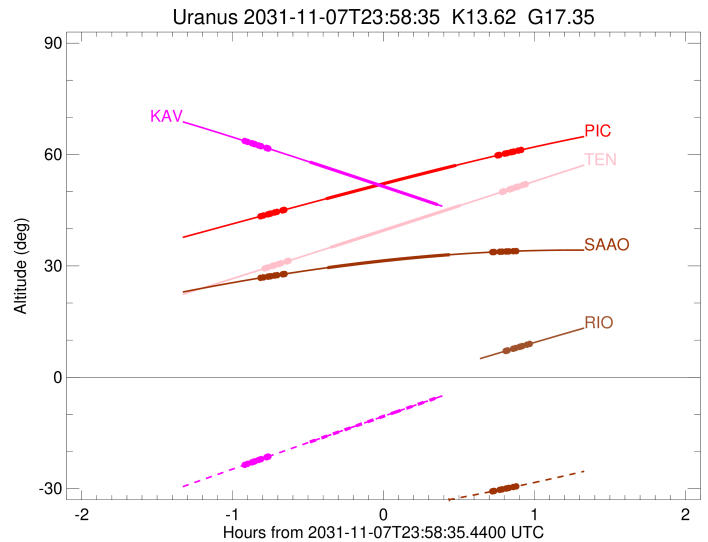
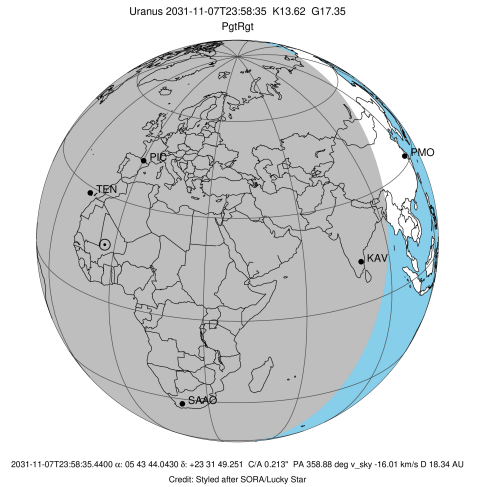
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2031-11-08T00:04:37.530
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        : 3428374394684939648
2Mass ID (if available) : 05434404+2331494
ICRS Star Coord at Epoch: 05h 43m 44.04296s +23:31:49.25118s
RUWE (>1.4 is poor)  : 0.98
K magnitude           : 13.620
G magnitude           : 17.347
RP magnitude          : 16.303
BP magnitude          : 18.437
DUPflag              : 0
Distance (au)         : 18.339
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -16.01
Sun-Target sep (deg)  : 138.66
Sun-Moon sep (deg)    : 56.96
B (ring opening deg)  : 78.35
PA of pole (deg)      : 45.75
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.409
C/A sky separation (km) : 5445.6
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_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	2031-11-07T23:12:27.805	-12.81x	-26.55	51111.21	-16.05			
lambda	I	2031-11-07T23:13:35.417	-12.57x	-26.77	50026.71	-16.04			
delta	I	2031-11-07T23:15:23.063	-12.18x	-27.11	48300.35	-16.04			
gamma	I	2031-11-07T23:16:04.785	-12.03x	-27.24	47631.34	-16.03			
eta	I	2031-11-07T23:16:33.177	-11.93x	-27.33	47176.12	-16.03			
beta	I	2031-11-07T23:18:07.439	-11.59x	-27.63	45664.89	-16.03			
alpha	I	2031-11-07T23:19:07.636	-11.37x	-27.82	44698.31	-16.03			
4	I	2031-11-07T23:21:17.702	-10.90x	-28.23	42615.74	-16.02			
5	I	2031-11-07T23:21:39.108	-10.83x	-28.30	42275.69	-16.01			
6	I	2031-11-07T23:22:07.867	-10.72x	-28.39	41806.20	-16.01			
Uranus	I	2031-11-07T23:39:07.699	-7.08x	-31.53	25144.63			-9.95	-10.41
Uranus	E	2031-11-08T00:30:17.283	3.64x	-40.09	25380.42			6.46	6.77
6	E	2031-11-08T00:47:10.388	7.08	-42.53	41859.71	16.19			
5	E	2031-11-08T00:47:29.575	7.14	-42.58	42177.91	16.19			
4	E	2031-11-08T00:47:51.600	7.22	-42.63	42530.38	16.20			
alpha	E	2031-11-08T00:50:08.241	7.68	-42.94	44744.68	16.22			
beta	E	2031-11-08T00:51:04.733	7.87	-43.07	45662.16	16.22			
eta	E	2031-11-08T00:52:38.012	8.18	-43.27	47176.12	16.23			
gamma	E	2031-11-08T00:53:05.413	8.27	-43.33	47620.97	16.24			
delta	E	2031-11-08T00:53:47.250	8.41	-43.43	48300.35	16.24			
lambda	E	2031-11-08T00:55:33.510	8.76	-43.66	50026.71	16.25			
epsilon	E	2031-11-08T00:56:49.763	9.02	-43.82	51266.26	16.27			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-11-08T00:00:25.810
 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 : 3428374394684939648
 2Mass ID (if available) : 05434404+2331494
 ICRS Star Coord at Epoch: 05h 43m 44.04296s +23:31:49.25118s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 13.620
 G magnitude : 17.347
 RP magnitude : 16.303
 BP magnitude : 18.437
 DUPflag : 0
 Distance (au) : 18.339
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.01
 Sun-Target sep (deg) : 138.66
 Sun-Moon sep (deg) : 57.06
 B (ring opening deg) : 78.35
 PA of pole (deg) : 45.75
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.606
 C/A sky separation (km) : 8059.5
 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_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	2031-11-07T23:09:44.705		26.78	-39.95	51134.80	-16.32		
lambda	I	2031-11-07T23:10:52.711		26.91	-39.88	50026.71	-16.29		
delta	I	2031-11-07T23:12:38.736		27.10	-39.78	48300.35	-16.28		
gamma	I	2031-11-07T23:13:19.856		27.18	-39.74	47631.23	-16.27		
eta	I	2031-11-07T23:13:47.834		27.23	-39.71	47176.12	-16.26		
beta	I	2031-11-07T23:15:20.704		27.40	-39.61	45666.16	-16.25		
alpha	I	2031-11-07T23:16:20.052		27.51	-39.55	44700.16	-16.24		
4	I	2031-11-07T23:18:28.580		27.74	-39.41	42616.23	-16.21		
5	I	2031-11-07T23:18:50.024		27.78	-39.39	42270.78	-16.20		
6	I	2031-11-07T23:19:18.255		27.83	-39.36	41804.24	-16.20		
Uranus	I	2031-11-07T23:36:14.202		29.51	-38.08	25092.05		-10.58	-11.07
Uranus	E	2031-11-08T00:24:57.467		33.02	-32.94	25430.09		5.48	5.74
6	E	2031-11-08T00:41:51.886		33.72	-30.72	41857.64	16.26		
5	E	2031-11-08T00:42:10.951		33.73	-30.68	42174.86	16.27		
4	E	2031-11-08T00:42:33.129		33.74	-30.63	42531.53	16.28		
alpha	E	2031-11-08T00:44:49.016		33.81	-30.32	44745.77	16.31		
beta	E	2031-11-08T00:45:45.177		33.84	-30.19	45663.17	16.32		
eta	E	2031-11-08T00:47:17.805		33.88	-29.97	47176.12	16.34		
gamma	E	2031-11-08T00:47:45.025		33.89	-29.91	47620.96	16.34		
delta	E	2031-11-08T00:48:26.583		33.91	-29.81	48300.35	16.35		
lambda	E	2031-11-08T00:50:12.102		33.96	-29.56	50026.71	16.37		
epsilon	E	2031-11-08T00:51:28.840		33.99	-29.38	51283.30	16.40		