

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2024-10-14T10:22:17.900
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 57157360352933248
 2Mass ID (if available) : 03354370+1902093

Uranus 2024-10-14T10:22:17 K14.19 G16.32 PgtRgt

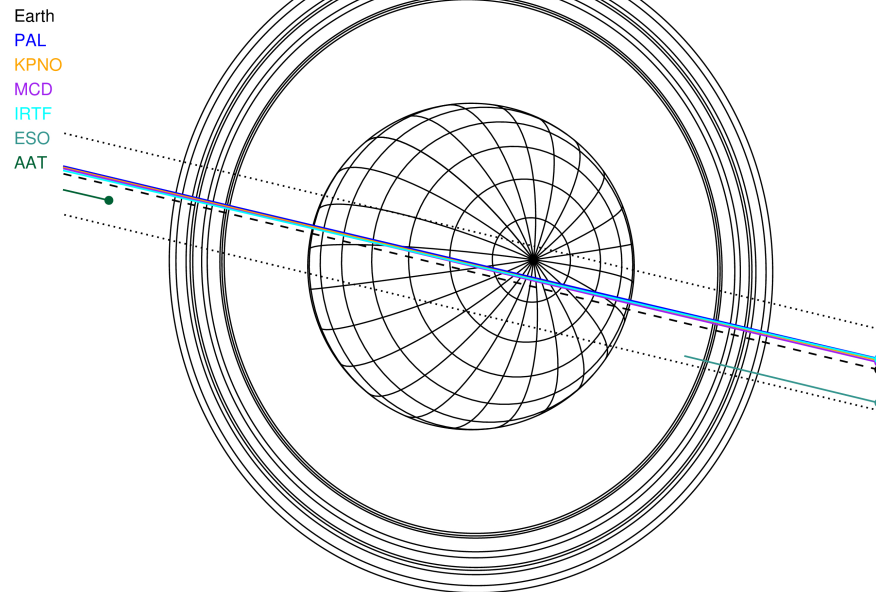
ICRS Star Coord at Epoch: 03h 35m 43.68397s +19:02:09.23941s

RUWE (>1.4 is poor) : 0.98
 K magnitude : 14.185
 G magnitude : 16.323
 RP magnitude : 15.657
 BP magnitude : 16.824
 DUPflag : 0
 Distance (au) : 18.741
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.06
 Sun-Target sep (deg) : 145.04
 Sun-Moon sep (deg) : 77.76
 B (ring opening deg) : 67.34
 PA of pole (deg) : -83.82

#	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

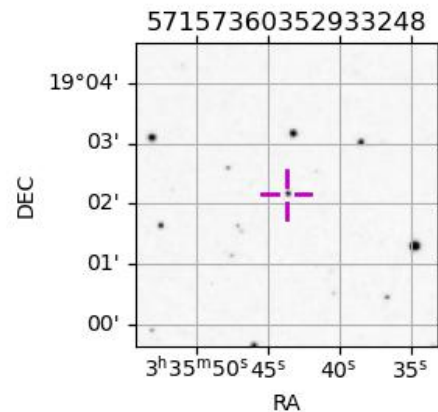


2024-10-14T10:22:17.9000 ra: 03 35 43.6840 s: +19 02 09.239 C/A 0.0577 PA 346.47 deg v_sky -18.06 km/s D 18.74 AU
 Credit: Styled after SORA/Lucky Star

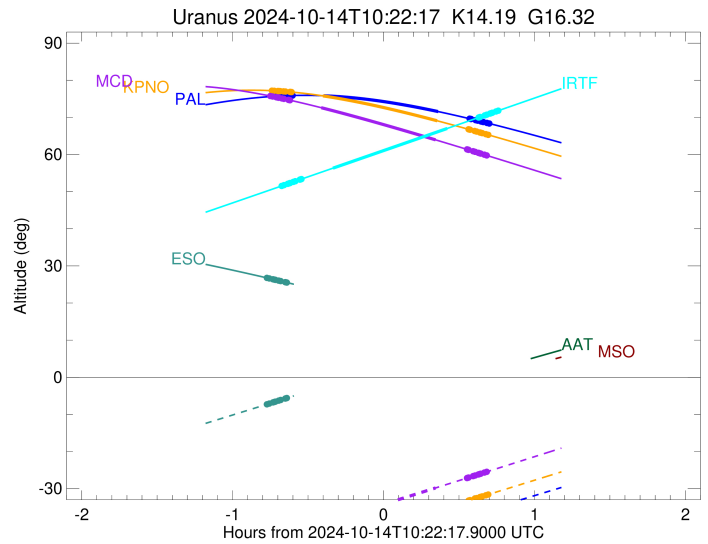
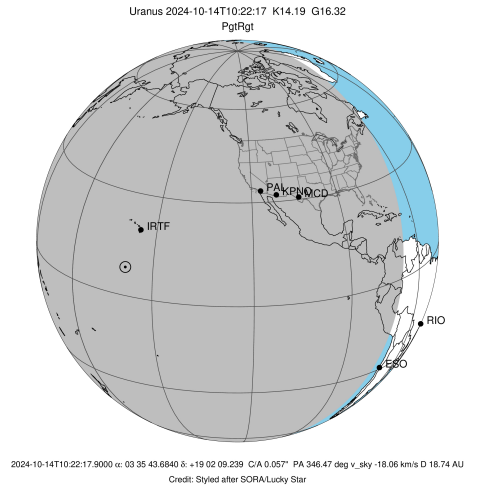


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	+++++	+ +	+++++	OCT 14 09:38 - OCT 14 11:04	PieRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	OCT 14 09:37 - OCT 14 11:03	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	OCT 14 09:36 - OCT 14 11:03	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	OCT 14 09:41 - OCT 14 11:07	PieRie
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European Southern Obs	-29.3	289.3	+++++			OCT 14 09:35 - OCT 14 09:43	PnnRin
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



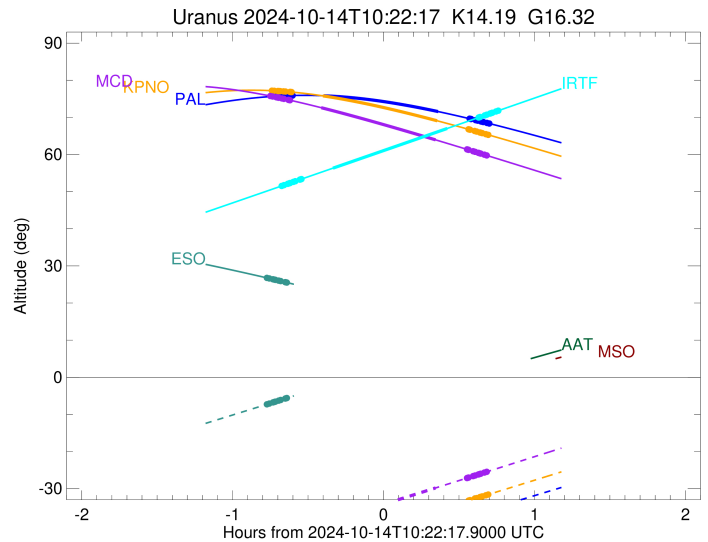
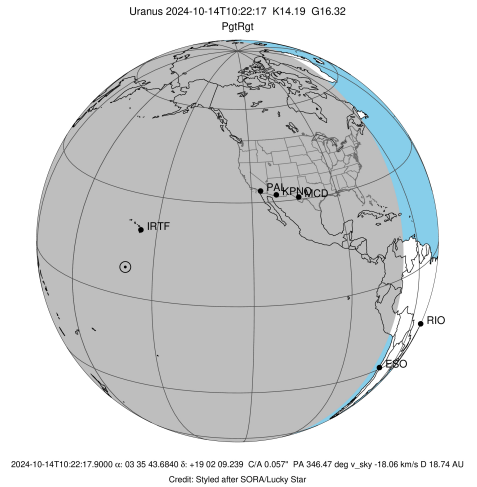
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2024-10-14T10:21:19.790
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 57157360352933248
 2Mass ID (if available) : 03354370+1902093
 ICRS Star Coord at Epoch: 03h 35m 43.68397s +19:02:09.23941s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 14.185
 G magnitude : 16.323
 RP magnitude : 15.657
 BP magnitude : 16.824
 DUPflag : 0
 Distance (au) : 18.741
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.06
 Sun-Target sep (deg) : 145.04
 Sun-Moon sep (deg) : 78.74
 B (ring opening deg) : 67.34
 PA of pole (deg) : -83.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.041
 C/A sky separation (km) : 557.4
 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	2024-10-14T09:38:01.729		75.65	-52.04	51532.24	-19.80		
lambda	I	2024-10-14T09:39:17.757		75.70	-51.82	50026.71	-19.80		
delta	I	2024-10-14T09:40:44.936		75.76	-51.57	48300.35	-19.80		
gamma	I	2024-10-14T09:41:19.241		75.78	-51.47	47621.02	-19.80		
eta	I	2024-10-14T09:41:41.708		75.79	-51.40	47176.12	-19.80		
beta	I	2024-10-14T09:42:57.910		75.83	-51.18	45666.86	-19.80		
alpha	I	2024-10-14T09:43:43.946		75.85	-51.04	44751.60	-19.80		
4	I	2024-10-14T09:45:35.405		75.89	-50.71	42550.48	-19.80		
5	I	2024-10-14T09:45:47.419		75.89	-50.67	42315.20	-19.80		
6	I	2024-10-14T09:46:12.928		75.90	-50.60	41797.83	-19.80		
Uranus	I	2024-10-14T09:58:38.678		75.83	-48.34	25108.03		21.47	22.39
Uranus	E	2024-10-14T10:44:01.461		71.57	-39.62	25121.82		-21.11	-22.02
6	E	2024-10-14T10:56:33.120		69.65	-37.12	41876.15	19.80		
5	E	2024-10-14T10:56:46.576		69.61	-37.07	42154.83	19.81		
4	E	2024-10-14T10:57:08.842		69.55	-37.00	42593.14	19.81		
alpha	E	2024-10-14T10:58:54.767		69.27	-36.64	44685.25	19.81		
beta	E	2024-10-14T10:59:43.590		69.13	-36.48	45655.95	19.81		
eta	E	2024-10-14T11:01:00.318		68.92	-36.22	47176.12	19.81		
gamma	E	2024-10-14T11:01:23.308		68.86	-36.14	47631.54	19.81		
delta	E	2024-10-14T11:01:57.070		68.76	-36.03	48300.35	19.81		
lambda	E	2024-10-14T11:03:24.218		68.52	-35.74	50026.71	19.81		
epsilon	E	2024-10-14T11:04:01.372		68.41	-35.61	50762.73	19.81		

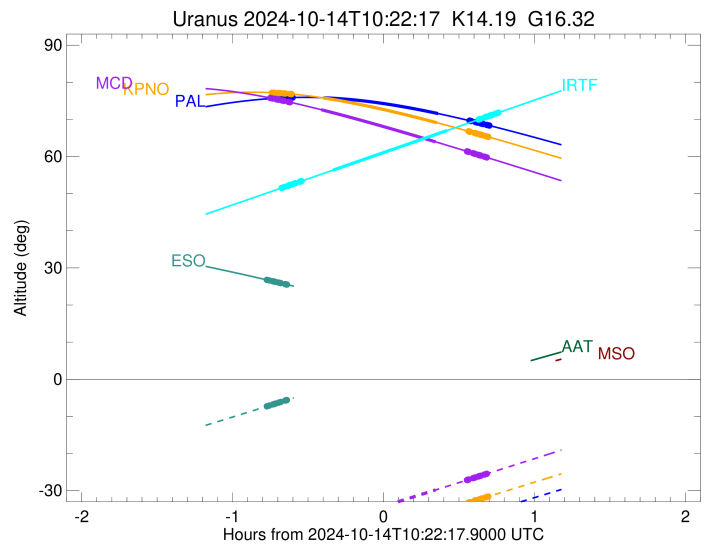
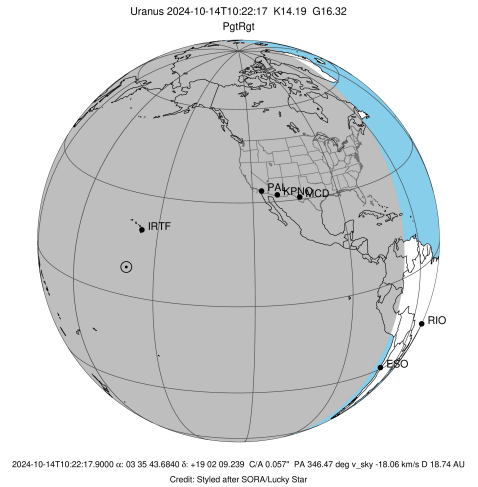
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2024-10-14T10:20:54.830
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       : 57157360352933248
2Mass ID (if available) : 03354370+1902093
ICRS Star Coord at Epoch: 03h 35m 43.68397s +19:02:09.23941s
RUWE (>1.4 is poor) : 0.98
K magnitude          : 14.185
G magnitude          : 16.323
RP magnitude         : 15.657
BP magnitude         : 16.824
DUPflag             : 0
Distance (au)        : 18.741
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -18.06
Sun-Target sep (deg) : 145.04
Sun-Moon sep (deg)  : 78.75
B (ring opening deg) : 67.34
PA of pole (deg)    : -83.82
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.024
C/A sky separation (km) : 325.8
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	2024-10-14T09:37:36.758		77.21	-48.98	51532.92	-19.81		
lambda	I	2024-10-14T09:38:52.783		77.17	-48.74	50026.71	-19.81		
delta	I	2024-10-14T09:40:19.921		77.11	-48.46	48300.35	-19.81		
gamma	I	2024-10-14T09:40:54.210		77.09	-48.35	47621.01	-19.81		
eta	I	2024-10-14T09:41:16.666		77.07	-48.28	47176.12	-19.81		
beta	I	2024-10-14T09:42:32.839		77.01	-48.04	45666.75	-19.81		
alpha	I	2024-10-14T09:43:18.846		76.97	-47.89	44751.64	-19.81		
4	I	2024-10-14T09:45:10.271		76.87	-47.53	42550.23	-19.81		
5	I	2024-10-14T09:45:22.268		76.85	-47.49	42315.22	-19.81		
6	I	2024-10-14T09:45:47.762		76.83	-47.41	41797.92	-19.81		
Uranus	I	2024-10-14T09:58:13.644		75.80	-44.99	25110.90		21.39	22.31
Uranus	E	2024-10-14T10:43:36.541		69.10	-35.82	25119.08		-21.18	-22.09
6	E	2024-10-14T10:56:07.818		66.79	-33.22	41876.24	19.80		
5	E	2024-10-14T10:56:21.271		66.75	-33.18	42154.83	19.81		
4	E	2024-10-14T10:56:43.529		66.68	-33.10	42592.94	19.81		
alpha	E	2024-10-14T10:58:29.481		66.35	-32.73	44685.28	19.80		
beta	E	2024-10-14T10:59:18.305		66.19	-32.56	45655.86	19.81		
eta	E	2024-10-14T11:00:35.052		65.95	-32.29	47176.12	19.81		
gamma	E	2024-10-14T11:00:58.046		65.88	-32.21	47631.53	19.81		
delta	E	2024-10-14T11:01:31.815		65.77	-32.10	48300.35	19.81		
lambda	E	2024-10-14T11:02:58.980		65.49	-31.79	50026.71	19.81		
epsilon	E	2024-10-14T11:03:36.168		65.37	-31.66	50763.22	19.81		

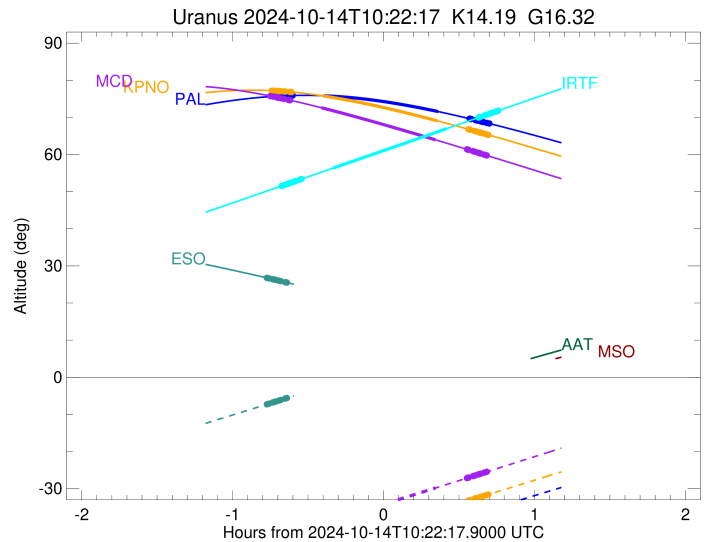
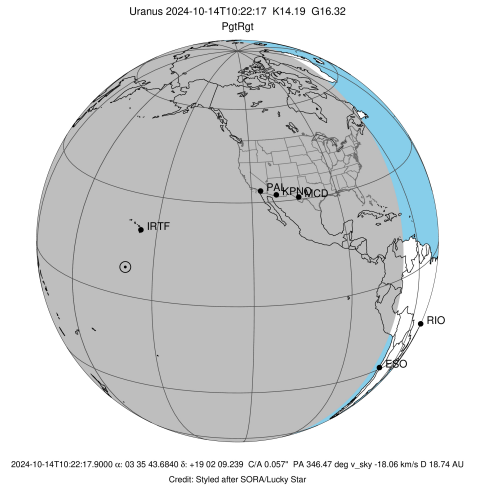
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2024-10-14T10:20:18.110
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 57157360352933248
 2Mass ID (if available) : 03354370+1902093
 ICRS Star Coord at Epoch: 03h 35m 43.68397s +19:02:09.23941s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 14.185
 G magnitude : 16.323
 RP magnitude : 15.657
 BP magnitude : 16.824
 DUPflag : 0
 Distance (au) : 18.741
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.06
 Sun-Target sep (deg) : 145.04
 Sun-Moon sep (deg) : 78.74
 B (ring opening deg) : 67.34
 PA of pole (deg) : -83.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.007
 C/A sky separation (km) : 92.3
 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	2024-10-14T09:36:59.126		75.81	-43.62	51533.65	-19.82		
lambda	I	2024-10-14T09:38:15.173		75.63	-43.37	50026.71	-19.82		
delta	I	2024-10-14T09:39:42.296		75.43	-43.07	48300.35	-19.82		
gamma	I	2024-10-14T09:40:16.580		75.35	-42.95	47621.01	-19.81		
eta	I	2024-10-14T09:40:39.032		75.30	-42.88	47176.12	-19.81		
beta	I	2024-10-14T09:41:55.200		75.11	-42.62	45666.63	-19.81		
alpha	I	2024-10-14T09:42:41.194		75.00	-42.46	44751.69	-19.81		
4	I	2024-10-14T09:44:32.622		74.72	-42.08	42549.98	-19.81		
5	I	2024-10-14T09:44:44.606		74.69	-42.04	42315.23	-19.82		
6	I	2024-10-14T09:45:10.094		74.63	-41.95	41798.03	-19.81		
Uranus	I	2024-10-14T09:57:36.426		72.61	-39.38	25113.98		21.32	22.23
Uranus	E	2024-10-14T10:43:00.380		63.96	-29.82	25116.49		-21.25	-22.16
6	E	2024-10-14T10:55:31.746		61.39	-27.14	41876.32	19.79		
5	E	2024-10-14T10:55:45.204		61.34	-27.09	42154.83	19.79		
4	E	2024-10-14T10:56:07.468		61.26	-27.01	42592.76	19.79		
alpha	E	2024-10-14T10:57:53.510		60.90	-26.64	44685.31	19.79		
beta	E	2024-10-14T10:58:42.366		60.73	-26.46	45655.78	19.79		
eta	E	2024-10-14T10:59:59.177		60.46	-26.19	47176.12	19.79		
gamma	E	2024-10-14T11:00:22.189		60.38	-26.11	47631.53	19.79		
delta	E	2024-10-14T11:00:55.986		60.26	-25.99	48300.35	19.79		
lambda	E	2024-10-14T11:02:23.223		59.96	-25.67	50026.71	19.79		
epsilon	E	2024-10-14T11:03:00.464		59.83	-25.54	50763.68	19.79		

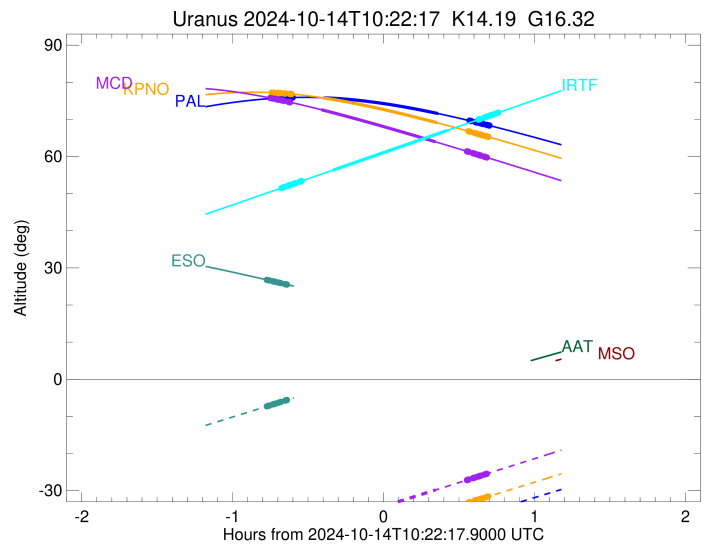
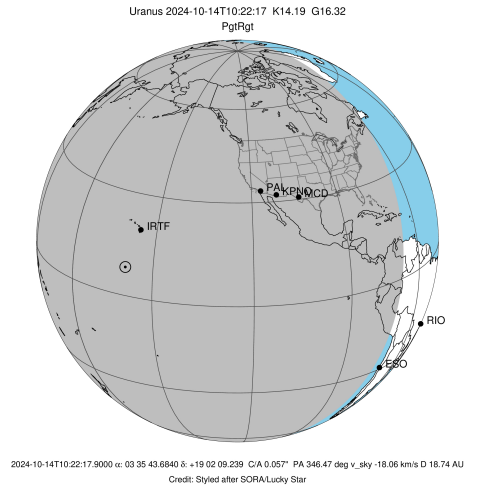
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2024-10-14T10:24:55.820
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       : 57157360352933248
2Mass ID (if available) : 03354370+1902093
ICRS Star Coord at Epoch: 03h 35m 43.68397s +19:02:09.23941s
RUWE (>1.4 is poor) : 0.98
K magnitude           : 14.185
G magnitude           : 16.323
RP magnitude          : 15.657
BP magnitude          : 16.824
DUPflag              : 0
Distance (au)        : 18.741
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -18.06
Sun-Target sep (deg) : 145.04
Sun-Moon sep (deg)   : 78.53
B (ring opening deg) : 67.34
PA of pole (deg)     : -83.82
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.016
C/A sky separation (km) : 218.4
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2024-10-14T09:41:30.119		51.47	-77.03	51532.60	-19.73		
lambda	I	2024-10-14T09:42:46.454		51.76	-77.17	50026.71	-19.73		
delta	I	2024-10-14T09:44:13.958		52.11	-77.34	48300.35	-19.73		
gamma	I	2024-10-14T09:44:48.389		52.24	-77.40	47621.02	-19.73		
eta	I	2024-10-14T09:45:10.938		52.33	-77.44	47176.12	-19.73		
beta	I	2024-10-14T09:46:27.416		52.63	-77.57	45666.79	-19.73		
alpha	I	2024-10-14T09:47:13.608		52.81	-77.65	44751.63	-19.73		
4	I	2024-10-14T09:49:05.459		53.25	-77.82	42550.31	-19.74		
5	I	2024-10-14T09:49:17.506		53.29	-77.84	42315.21	-19.74		
6	I	2024-10-14T09:49:43.097		53.39	-77.88	41797.89	-19.73		
Uranus	I	2024-10-14T10:02:11.415		56.32	-78.62	25110.67		21.40	22.32
Uranus	E	2024-10-14T10:47:38.398		67.03	-75.16	25116.05		-21.26	-22.17
6	E	2024-10-14T11:00:08.590		69.97	-73.04	41876.37	19.83		
5	E	2024-10-14T11:00:22.018		70.03	-73.00	42154.84	19.83		
4	E	2024-10-14T11:00:44.229		70.11	-72.93	42592.64	19.83		
alpha	E	2024-10-14T11:02:30.053		70.53	-72.61	44685.33	19.83		
beta	E	2024-10-14T11:03:18.794		70.72	-72.46	45655.71	19.84		
eta	E	2024-10-14T11:04:35.430		71.02	-72.22	47176.12	19.84		
gamma	E	2024-10-14T11:04:58.387		71.11	-72.15	47631.53	19.84		
delta	E	2024-10-14T11:05:32.102		71.25	-72.04	48300.35	19.84		
lambda	E	2024-10-14T11:06:59.119		71.59	-71.77	50026.71	19.84		
epsilon	E	2024-10-14T11:07:36.286		71.73	-71.65	50764.13	19.84		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2024-10-14T10:19:09.990
 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 : 57157360352933248
 2Mass ID (if available) : 03354370+1902093
 ICRS Star Coord at Epoch: 03h 35m 43.68397s +19:02:09.23941s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 14.185
 G magnitude : 16.323
 RP magnitude : 15.657
 BP magnitude : 16.824
 DUPflag : 0
 Distance (au) : 18.741
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.06
 Sun-Target sep (deg) : 145.04
 Sun-Moon sep (deg) : 78.19
 B (ring opening deg) : 67.34
 PA of pole (deg) : -83.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.423
 C/A sky separation (km) : 5745.8
 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	2024-10-14T09:35:37.124		26.82	-7.35	51546.54	-19.61		
lambda	I	2024-10-14T09:36:54.676		26.62	-7.08	50026.71	-19.59		
delta	I	2024-10-14T09:38:22.813		26.39	-6.77	48300.35	-19.58		
gamma	I	2024-10-14T09:38:57.513		26.30	-6.64	47620.96	-19.58		
eta	I	2024-10-14T09:39:20.238		26.24	-6.56	47176.12	-19.57		
beta	I	2024-10-14T09:40:37.514		26.04	-6.29	45664.00	-19.56		
alpha	I	2024-10-14T09:41:23.963		25.91	-6.13	44752.34	-19.55		
4	I	2024-10-14T09:43:17.269		25.61	-5.72	42544.48	-19.53		
5	I	2024-10-14T09:43:29.209		25.58	-5.68	42314.67	-19.53		
6	I	2024-10-14T09:43:54.944		25.51	-5.59	41800.82	-19.52		
Uranus	I	2024-10-14T09:56:51.522		23.39	-2.82x	25205.52		18.85	19.67
Uranus	E	2024-10-14T10:41:22.493		15.57	6.80x	25067.25		-22.50	-23.45
6	E	2024-10-14T10:54:03.559		13.22	9.56x	41878.23	19.44		
5	E	2024-10-14T10:54:17.183		13.17	9.61x	42155.74	19.45		
4	E	2024-10-14T10:54:39.467		13.10	9.69x	42587.23	19.45		
alpha	E	2024-10-14T10:56:27.641		12.76	10.08x	44686.44	19.46		
beta	E	2024-10-14T10:57:17.116		12.61	10.26x	45653.41	19.47		
eta	E	2024-10-14T10:58:35.286		12.36	10.55x	47176.12	19.48		
gamma	E	2024-10-14T10:58:58.659		12.29	10.63x	47631.41	19.48		
delta	E	2024-10-14T10:59:32.996		12.18	10.76x	48300.35	19.48		
lambda	E	2024-10-14T11:01:01.582		11.90	11.08x	50026.71	19.49		
epsilon	E	2024-10-14T11:01:40.227		11.78	11.22x	50780.03	19.50		