

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-10-16T11:49:39.490
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3418382509750084480
 2Mass ID (if available) : 05072523+2254365

Uranus 2029-10-16T11:49:39 K11.85 G13.84 PgtRgt

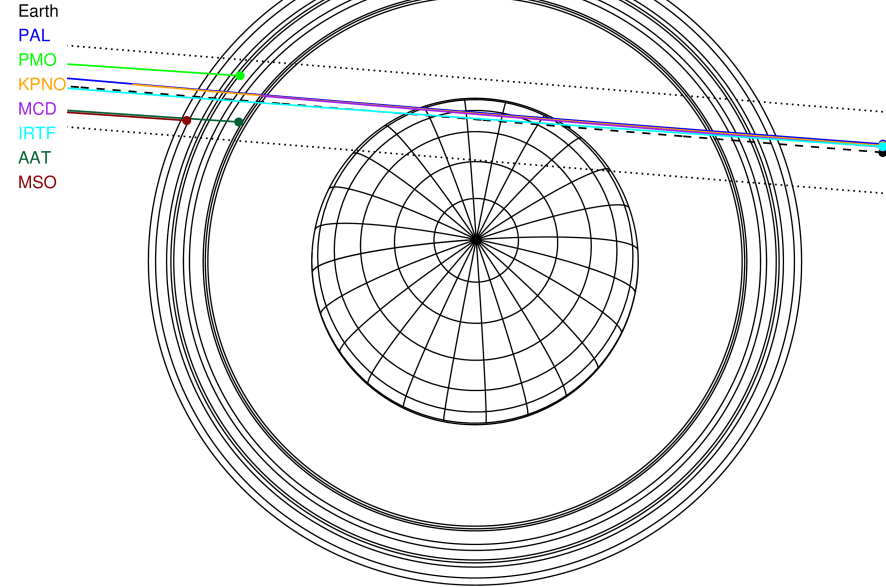
ICRS Star Coord at Epoch: 05h 07m 25.25042s +22:54:36.44294s

RUWE (>1.4 is poor) : 1.08
 K magnitude : 11.854
 G magnitude : 13.836
 RP magnitude : 13.165
 BP magnitude : 14.341
 DUPflag : 0
 Distance (au) : 18.644
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.80
 Sun-Target sep (deg) : 125.08
 Sun-Moon sep (deg) : 120.66
 B (ring opening deg) : 82.25
 PA of pole (deg) : -3.27

#	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

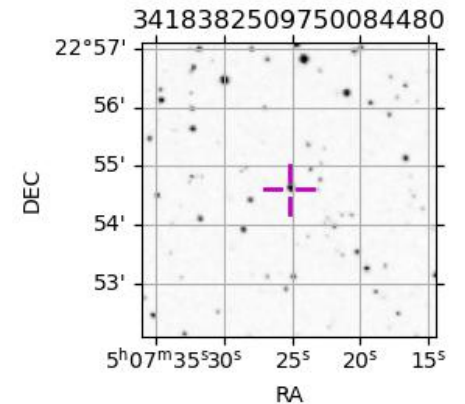


2029-10-16T11:49:39.4900 ra: 05 07 25.25042 ra: +22 54 36.443 C/A 1.6477 PA 175.35 deg v_sky -10.80 km/s D 18.64 AU
 Credit: Styled after SORA/Lucky Star

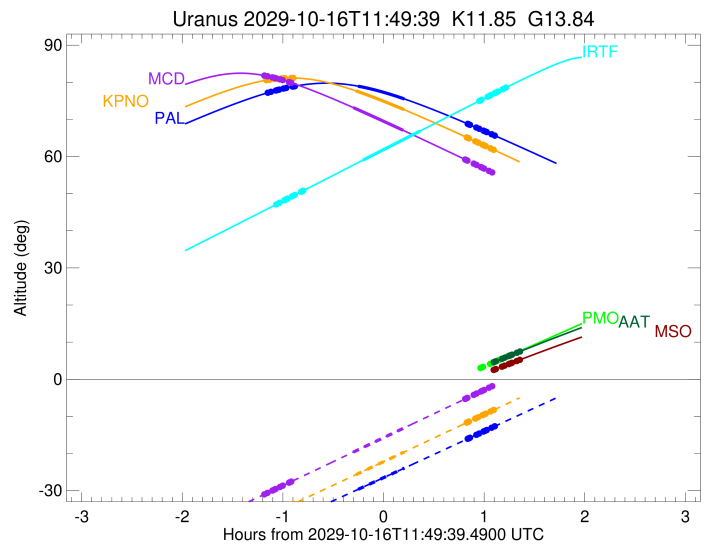
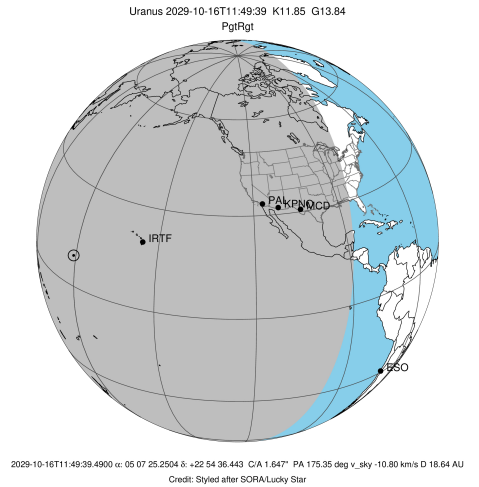


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 16 10:40 - OCT 16 12:55	PieRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8			++++	OCT 16 12:57 - OCT 16 13:04	PnnRne
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	OCT 16 10:39 - OCT 16 12:54	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++	OCT 16 10:38 - OCT 16 12:39	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	OCT 16 10:45 - OCT 16 13:01	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					PnnRnn
AAT	Siding Spring (AAT)	-31.3	149.1			+++++	OCT 16 13:00 - OCT 16 13:10	PnnRne
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0			+	OCT 16 13:10 - OCT 16 13:10	PnnRne



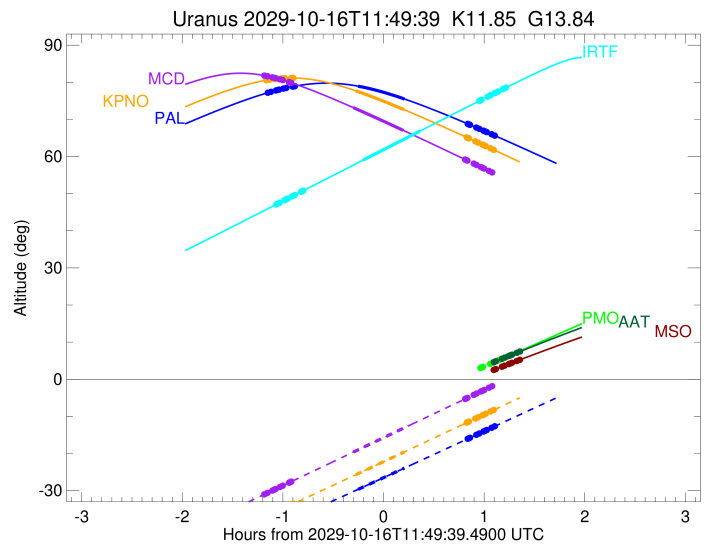
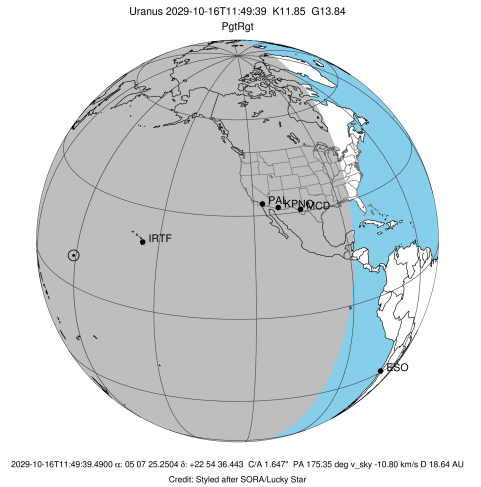
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-10-16T11:48:22.480
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3418382509750084480
 2Mass ID (if available) : 05072523+2254365
 ICRS Star Coord at Epoch: 05h 07m 25.25042s +22:54:36.44294s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 11.854
 G magnitude : 13.836
 RP magnitude : 13.165
 BP magnitude : 14.341
 DUPflag : 0
 Distance (au) : 18.644
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.80
 Sun-Target sep (deg) : 125.08
 Sun-Moon sep (deg) : 121.38
 B (ring opening deg) : 82.25
 PA of pole (deg) : -3.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.721
 C/A sky separation (km) : 23276.7
 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



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-10-16T10:40:30.191		77.16	-40.63	51258.01	-9.89		
lambda	I	2029-10-16T10:42:34.650		77.43	-40.22	50026.71	-9.86		
delta	I	2029-10-16T10:45:30.616		77.80	-39.64	48300.35	-9.76		
gamma	I	2029-10-16T10:46:39.963		77.94	-39.41	47625.04	-9.72		
eta	I	2029-10-16T10:47:26.234		78.03	-39.25	47176.12	-9.69		
beta	I	2029-10-16T10:50:05.372		78.32	-38.72	45642.93	-9.58		
alpha	I	2029-10-16T10:51:38.661		78.48	-38.41	44751.98	-9.51		
4	I	2029-10-16T10:55:34.513		78.85	-37.62	42530.73	-9.32		
5	I	2029-10-16T10:56:15.113		78.91	-37.48	42156.55	-9.28		
6	I	2029-10-16T10:56:53.710		78.96	-37.35	41794.80	-9.24		
Uranus	I	2029-10-16T11:34:30.685		78.95	-29.66	25069.89		7.12	7.46
Uranus	E	2029-10-16T12:02:09.655		75.51	-23.92	25051.18		7.26	7.60
6	E	2029-10-16T12:39:54.210		68.79	-16.03	41854.62	9.25		
5	E	2029-10-16T12:40:39.750		68.65	-15.88	42279.66	9.29		
4	E	2029-10-16T12:41:14.897		68.53	-15.75	42605.55	9.33		
alpha	E	2029-10-16T12:44:56.969		67.82	-14.98	44698.76	9.52		
beta	E	2029-10-16T12:46:39.421		67.48	-14.62	45677.11	9.59		
eta	E	2029-10-16T12:49:14.864		66.97	-14.08	47176.12	9.70		
gamma	E	2029-10-16T12:50:01.731		66.82	-13.92	47631.34	9.73		
delta	E	2029-10-16T12:51:10.349		66.60	-13.68	48300.35	9.77		
lambda	E	2029-10-16T12:54:06.103		66.02	-13.07	50026.71	9.87		
epsilon	E	2029-10-16T12:55:20.722		65.77	-12.81	50764.89	9.90		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-10-16T11:57:17.230
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3418382509750084480
 2Mass ID (if available) : 05072523+2254365
 ICRS Star Coord at Epoch: 05h 07m 25.25042s +22:54:36.44294s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 11.854
 G magnitude : 13.836
 RP magnitude : 13.165
 BP magnitude : 14.341
 DUPflag : 0
 Distance (au) : 18.644
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.80
 Sun-Target sep (deg) : 125.08
 Sun-Moon sep (deg) : 120.92
 B (ring opening deg) : 82.25
 PA of pole (deg) : -3.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.961
 C/A sky separation (km) : 26515.5
 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



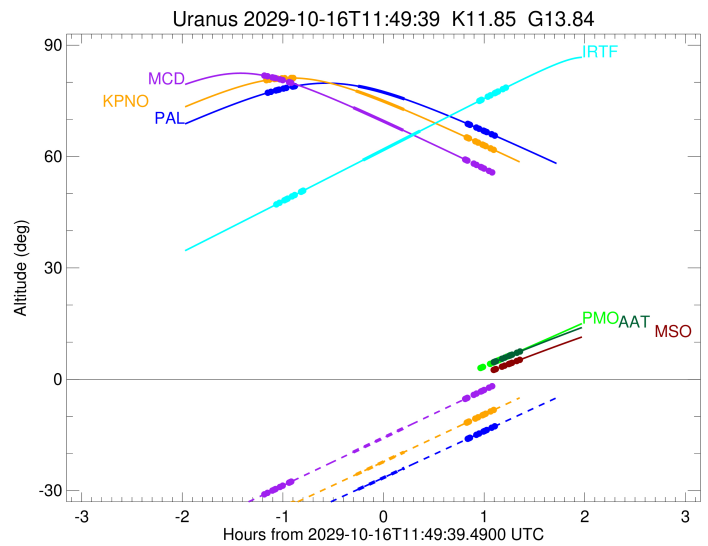
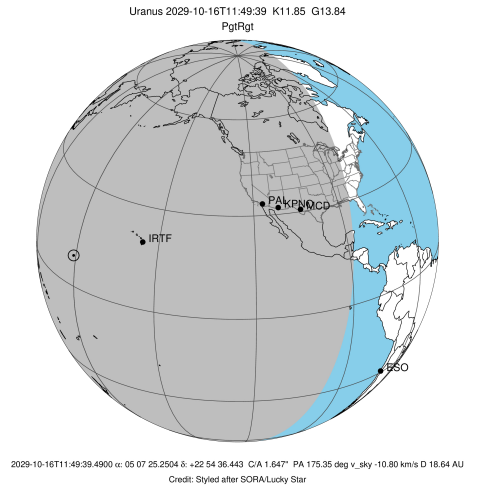
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-10-16T10:48:22.257		-17.97x	-17.09	51225.79	-8.91		
lambda	I	2029-10-16T10:50:36.785		-17.62x	-17.56	50026.71	-8.87		
delta	I	2029-10-16T10:53:52.714		-17.11x	-18.26	48300.35	-8.75		
gamma	I	2029-10-16T10:55:10.104		-16.90x	-18.53	47625.50	-8.69		
eta	I	2029-10-16T10:56:01.910		-16.77x	-18.71	47176.12	-8.66		
beta	I	2029-10-16T10:59:00.323		-16.29x	-19.35	45643.81	-8.52		
alpha	I	2029-10-16T11:00:45.564		-16.01x	-19.72	44751.29	-8.43		
4	I	2029-10-16T11:05:12.435		-15.29x	-20.66	42533.04	-8.18		
5	I	2029-10-16T11:05:58.831		-15.17x	-20.83	42158.71	-8.14		
6	I	2029-10-16T11:06:42.968		-15.05x	-20.98	41795.27	-8.09		

No planet occultations

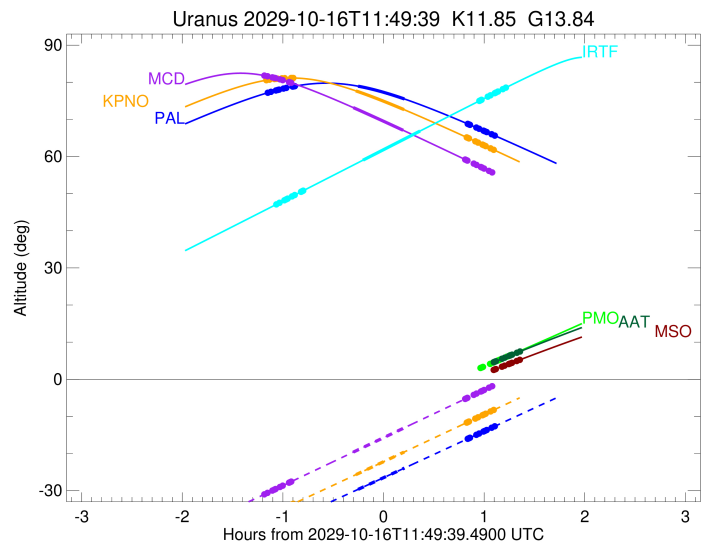
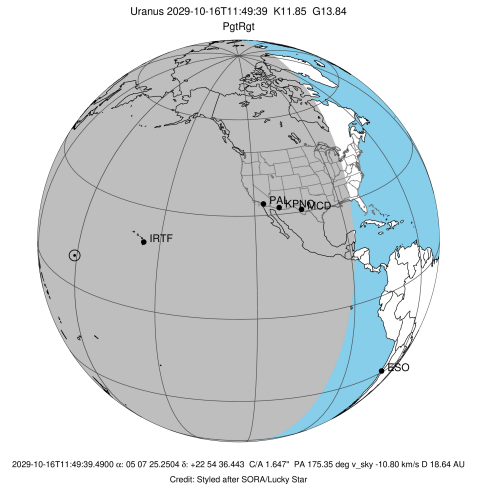
6	E	2029-10-16T12:47:29.999		3.04x	-42.02	41851.29	8.23		
5	E	2029-10-16T12:48:20.723		3.20x	-42.19	42273.98	8.28		
4	E	2029-10-16T12:49:00.529		3.33x	-42.32	42603.02	8.33		
alpha	E	2029-10-16T12:53:08.207		4.13x	-43.15	44700.88	8.60		
beta	E	2029-10-16T12:55:01.076		4.49x	-43.53	45676.19	8.69		
eta	E	2029-10-16T12:57:52.132		5.05	-44.10	47176.12	8.84		
gamma	E	2029-10-16T12:58:43.503		5.21	-44.27	47631.44	8.88		
delta	E	2029-10-16T12:59:58.549		5.46	-44.52	48300.35	8.94		
lambda	E	2029-10-16T13:03:10.088		6.08	-45.16	50026.71	9.08		
epsilon	E	2029-10-16T13:04:30.352		6.34	-45.42	50757.83	9.12		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-10-16T11:47:36.100
 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 : 3418382509750084480
 2Mass ID (if available) : 05072523+2254365
 ICRS Star Coord at Epoch: 05h 07m 25.25042s +22:54:36.44294s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 11.854
 G magnitude : 13.836
 RP magnitude : 13.165
 BP magnitude : 14.341
 DUPflag : 0
 Distance (au) : 18.644
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.80
 Sun-Target sep (deg) : 125.08
 Sun-Moon sep (deg) : 121.33
 B (ring opening deg) : 82.25
 PA of pole (deg) : -3.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.710
 C/A sky separation (km) : 23122.3
 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	2029-10-16T10:39:38.525		80.55	-36.92	51259.82	-9.91		
lambda	I	2029-10-16T10:41:42.821		80.70	-36.49	50026.71	-9.89		
delta	I	2029-10-16T10:44:38.281		80.88	-35.88	48300.35	-9.79		
gamma	I	2029-10-16T10:45:47.424		80.94	-35.64	47625.01	-9.75		
eta	I	2029-10-16T10:46:33.553		80.98	-35.48	47176.12	-9.72		
beta	I	2029-10-16T10:49:12.198		81.07	-34.94	45642.89	-9.61		
alpha	I	2029-10-16T10:50:45.175		81.11	-34.61	44752.01	-9.54		
4	I	2029-10-16T10:54:40.222		81.16	-33.80	42530.61	-9.35		
5	I	2029-10-16T10:55:20.665		81.15	-33.66	42156.46	-9.31		
6	I	2029-10-16T10:55:59.115		81.15	-33.52	41794.79	-9.28		
Uranus	I	2029-10-16T11:33:09.028		77.69	-25.71	25077.40		7.06	7.40
Uranus	E	2029-10-16T12:01:58.516		72.63	-19.60	25056.99		7.22	7.56
6	E	2029-10-16T12:39:18.179		65.15	-11.67	41854.74	9.27		
5	E	2029-10-16T12:40:03.626		65.00	-11.51	42279.87	9.31		
4	E	2029-10-16T12:40:38.680		64.88	-11.39	42605.64	9.35		
alpha	E	2029-10-16T12:44:20.296		64.11	-10.61	44698.68	9.54		
beta	E	2029-10-16T12:46:02.587		63.76	-10.25	45677.14	9.61		
eta	E	2029-10-16T12:48:37.795		63.22	-9.70	47176.12	9.71		
gamma	E	2029-10-16T12:49:24.598		63.06	-9.53	47631.34	9.74		
delta	E	2029-10-16T12:50:33.130		62.82	-9.29	48300.35	9.78		
lambda	E	2029-10-16T12:53:28.690		62.21	-8.67	50026.71	9.88		
epsilon	E	2029-10-16T12:54:43.267		61.95	-8.41	50765.17	9.91		

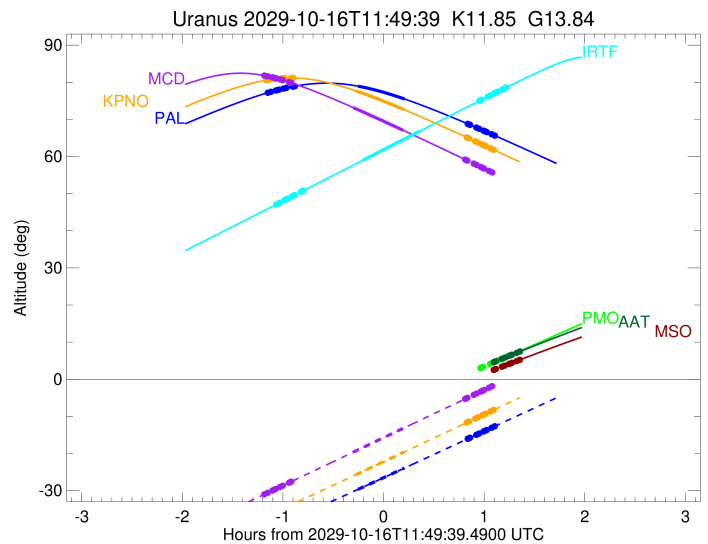
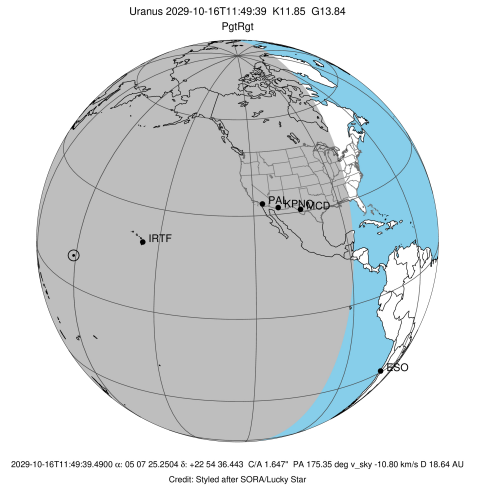
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-10-16T11:46:29.350
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 3418382509750084480
 2Mass ID (if available) : 05072523+2254365
 ICRS Star Coord at Epoch: 05h 07m 25.25042s +22:54:36.44294s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 11.854
 G magnitude : 13.836
 RP magnitude : 13.165
 BP magnitude : 14.341
 DUPflag : 0
 Distance (au) : 18.644
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.80
 Sun-Target sep (deg) : 125.08
 Sun-Moon sep (deg) : 121.26
 B (ring opening deg) : 82.25
 PA of pole (deg) : -3.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.701
 C/A sky separation (km) : 23007.6
 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	2029-10-16T10:38:26.003		81.82	-31.04	51261.51	-9.93		
lambda	I	2029-10-16T10:40:30.229		81.63	-30.60	50026.71	-9.91		
delta	I	2029-10-16T10:43:25.341		81.33	-29.98	48300.35	-9.81		
gamma	I	2029-10-16T10:44:34.346		81.20	-29.73	47624.99	-9.77		
eta	I	2029-10-16T10:45:20.377		81.11	-29.57	47176.12	-9.74		
beta	I	2029-10-16T10:47:58.689		80.79	-29.00	45642.85	-9.63		
alpha	I	2029-10-16T10:49:31.454		80.58	-28.67	44752.03	-9.56		
4	I	2029-10-16T10:53:25.967		80.04	-27.83	42530.51	-9.37		
5	I	2029-10-16T10:54:06.304		79.94	-27.69	42156.37	-9.34		
6	I	2029-10-16T10:54:44.656		79.85	-27.55	41794.78	-9.30		
Uranus	I	2029-10-16T11:31:36.382		73.19	-19.63	25083.36		7.02	7.35
Uranus	E	2029-10-16T12:01:17.605		67.08	-13.24	25060.92		7.19	7.53
6	E	2029-10-16T12:38:22.207		59.19	-5.29	41854.81	9.28		
5	E	2029-10-16T12:39:07.641		59.03	-5.13	42279.97	9.31		
4	E	2029-10-16T12:39:42.674		58.90	-5.01	42605.69	9.35		
alpha	E	2029-10-16T12:43:24.246		58.11	-4.22x	44698.65	9.54		
beta	E	2029-10-16T12:45:06.549		57.74	-3.86x	45677.15	9.60		
eta	E	2029-10-16T12:47:41.792		57.18	-3.31x	47176.12	9.71		
gamma	E	2029-10-16T12:48:28.612		57.02	-3.14x	47631.34	9.74		
delta	E	2029-10-16T12:49:37.173		56.77	-2.90x	48300.35	9.78		
lambda	E	2029-10-16T12:52:32.831		56.14	-2.28x	50026.71	9.88		
epsilon	E	2029-10-16T12:53:47.469		55.87	-2.01x	50765.27	9.90		

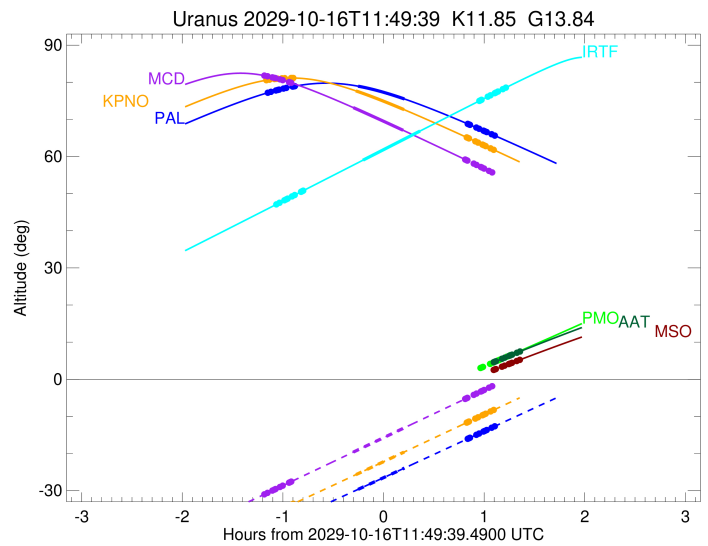
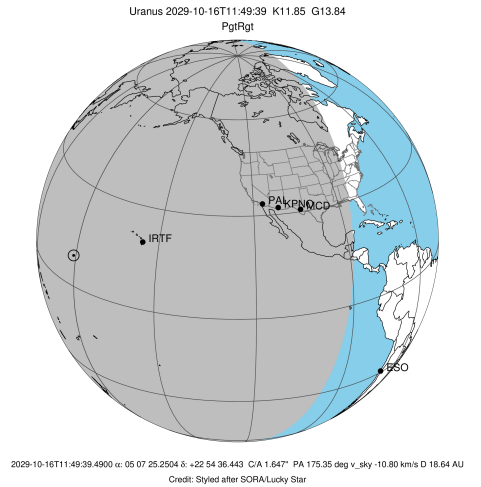
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2029-10-16T11:54:28.480
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       : 3418382509750084480
2Mass ID (if available) : 05072523+2254365
ICRS Star Coord at Epoch: 05h 07m 25.25042s +22:54:36.44294s
RUWE (>1.4 is poor) : 1.08
K magnitude           : 11.854
G magnitude           : 13.836
RP magnitude          : 13.165
BP magnitude          : 14.341
DUPflag              : 0
Distance (au)         : 18.644
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -10.80
Sun-Target sep (deg) : 125.08
Sun-Moon sep (deg)   : 121.59
B (ring opening deg) : 82.25
PA of pole (deg)     : -3.27
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.652
C/A sky separation (km) : 22343.3
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl.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	2029-10-16T10:45:35.489		47.07	-75.92	51262.59	-9.91		
lambda	I	2029-10-16T10:47:40.066		47.55	-75.59	50026.71	-9.89		
delta	I	2029-10-16T10:50:35.359		48.22	-75.10	48300.35	-9.80		
gamma	I	2029-10-16T10:51:44.381		48.48	-74.91	47624.97	-9.77		
eta	I	2029-10-16T10:52:30.402		48.66	-74.78	47176.12	-9.74		
beta	I	2029-10-16T10:55:08.571		49.27	-74.31	45642.81	-9.65		
alpha	I	2029-10-16T10:56:41.155		49.62	-74.04	44752.06	-9.58		
4	I	2029-10-16T11:00:34.915		50.52	-73.32	42530.38	-9.41		
5	I	2029-10-16T11:01:15.060		50.67	-73.20	42156.27	-9.38		
6	I	2029-10-16T11:01:53.221		50.82	-73.08	41794.77	-9.35		
Uranus	I	2029-10-16T11:37:23.804		59.01	-65.80	25106.53		6.84	7.16
Uranus	E	2029-10-16T12:11:28.554		66.88	-58.21	25093.18		6.94	7.27
6	E	2029-10-16T12:46:50.093		74.99	-50.08	41856.01	9.46		
5	E	2029-10-16T12:47:34.771		75.16	-49.90	42282.02	9.50		
4	E	2029-10-16T12:48:08.994		75.29	-49.77	42606.58	9.53		
alpha	E	2029-10-16T12:51:46.303		76.11	-48.93	44697.84	9.71		
beta	E	2029-10-16T12:53:26.901		76.49	-48.54	45677.50	9.78		
eta	E	2029-10-16T12:55:59.404		77.07	-47.95	47176.12	9.88		
gamma	E	2029-10-16T12:56:45.417		77.24	-47.77	47631.29	9.91		
delta	E	2029-10-16T12:57:52.817		77.49	-47.51	48300.35	9.95		
lambda	E	2029-10-16T13:00:45.534		78.14	-46.84	50026.71	10.04		
epsilon	E	2029-10-16T13:01:59.303		78.42	-46.55	50768.96	10.07		

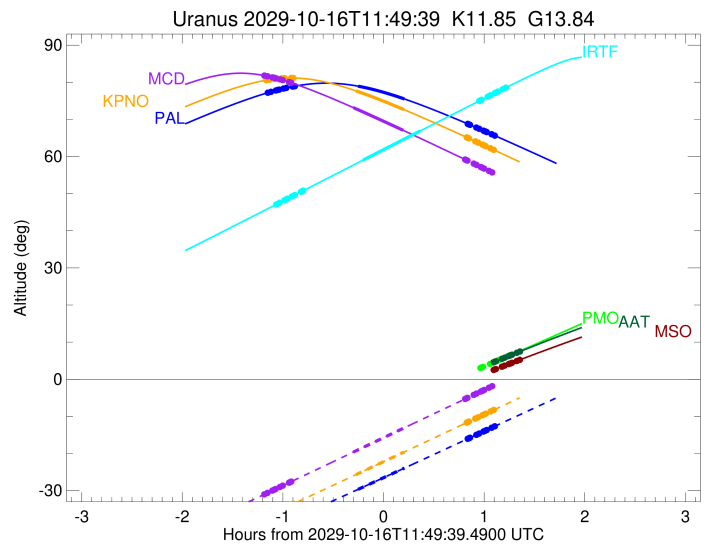
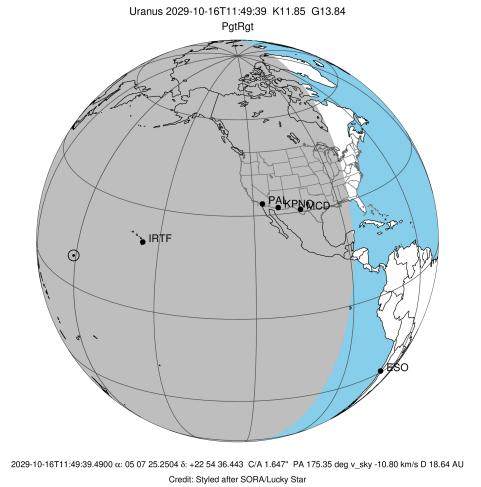
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-10-16T11:58:49.430
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 3418382509750084480
 2Mass ID (if available) : 05072523+2254365
 ICRS Star Coord at Epoch: 05h 07m 25.25042s +22:54:36.44294s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 11.854
 G magnitude : 13.836
 RP magnitude : 13.165
 BP magnitude : 14.341
 DUPflag : 0
 Distance (au) : 18.644
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.80
 Sun-Target sep (deg) : 125.08
 Sun-Moon sep (deg) : 120.96
 B (ring opening deg) : 82.25
 PA of pole (deg) : -3.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.430
 C/A sky separation (km) : 19337.7
 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



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-10-16T10:45:22.967		-21.14x	-30.41	51286.82	-9.85		
lambda	I	2029-10-16T10:47:30.773		-20.70x	-30.79	50026.71	-9.84		
delta	I	2029-10-16T10:50:26.742		-20.09x	-31.30	48300.35	-9.78		
gamma	I	2029-10-16T10:51:35.921		-19.85x	-31.50	47624.62	-9.76		
eta	I	2029-10-16T10:52:21.938		-19.70x	-31.63	47176.12	-9.74		
beta	I	2029-10-16T10:54:59.956		-19.15x	-32.09	45642.26	-9.67		
alpha	I	2029-10-16T10:56:32.094		-18.83x	-32.35	44752.34	-9.63		
4	I	2029-10-16T11:00:24.202		-18.04x	-33.01	42528.96	-9.52		
5	I	2029-10-16T11:01:03.771		-17.90x	-33.12	42155.31	-9.50		
6	I	2029-10-16T11:01:41.435		-17.77x	-33.22	41794.80	-9.47		
Uranus	I	2029-10-16T11:33:51.635		-11.22x	-38.36	25221.54		5.88	6.16
Uranus	E	2029-10-16T12:23:38.597		-1.39x	-44.87	25210.43		5.98	6.26
6	E	2029-10-16T12:55:26.705		4.62x	-47.77	41859.35	9.68		
5	E	2029-10-16T12:56:10.723		4.76x	-47.82	42287.59	9.70		
4	E	2029-10-16T12:56:43.856		4.86x	-47.86	42608.93	9.73		
alpha	E	2029-10-16T13:00:16.896		5.51	-48.11	44695.69	9.86		
beta	E	2029-10-16T13:01:56.380		5.82	-48.22	45678.39	9.91		
eta	E	2029-10-16T13:04:27.003		6.28	-48.38	47176.12	9.98		
gamma	E	2029-10-16T13:05:12.542		6.41	-48.42	47631.14	10.00		
delta	E	2029-10-16T13:06:19.347		6.62	-48.49	48300.35	10.03		
lambda	E	2029-10-16T13:09:10.807		7.14	-48.65	50026.71	10.10		
epsilon	E	2029-10-16T13:10:25.257		7.36	-48.72	50780.02	10.12		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-10-16T11:58:27.730
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MSO
 Location : Mt. Stromlo Observatory
 Latitude (deg) : -35.32000
 E. Longitude (deg) : 149.00833
 Altitude (km) : 0.770
 Gaia source ID : 3418382509750084480
 2Mass ID (if available) : 05072523+2254365
 ICRS Star Coord at Epoch: 05h 07m 25.25042s +22:54:36.44294s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 11.854
 G magnitude : 13.836
 RP magnitude : 13.165
 BP magnitude : 14.341
 DUPflag : 0
 Distance (au) : 18.644
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.80
 Sun-Target sep (deg) : 125.08
 Sun-Moon sep (deg) : 120.92
 B (ring opening deg) : 82.25
 PA of pole (deg) : -3.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.404
 C/A sky separation (km) : 18991.1
 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



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-10-16T10:44:47.691	-22.28x	-27.93	51289.89	-9.88			
lambda	I	2029-10-16T10:46:55.382	-21.86x	-28.28	50026.71	-9.87			
delta	I	2029-10-16T10:49:50.729	-21.27x	-28.76	48300.35	-9.82			
gamma	I	2029-10-16T10:50:59.656	-21.04x	-28.95	47624.58	-9.79			
eta	I	2029-10-16T10:51:45.493	-20.89x	-29.07	47176.12	-9.78			
beta	I	2029-10-16T10:54:22.889	-20.37x	-29.49	45642.20	-9.71			
alpha	I	2029-10-16T10:55:54.630	-20.07x	-29.74	44752.36	-9.67			
4	I	2029-10-16T10:59:45.700	-19.30x	-30.35	42528.80	-9.56			
5	I	2029-10-16T11:00:25.060	-19.17x	-30.45	42155.22	-9.54			
6	I	2029-10-16T11:01:02.536	-19.05x	-30.55	41794.82	-9.52			
Uranus	I	2029-10-16T11:32:50.337	-12.82x	-35.26	25234.24			5.77	6.04
Uranus	E	2029-10-16T12:23:56.327	-3.15x	-41.37	25222.27			5.88	6.15
6	E	2029-10-16T12:55:23.228	2.52x	-43.95	41859.67	9.72			
5	E	2029-10-16T12:56:07.086	2.65x	-43.99	42288.12	9.74			
4	E	2029-10-16T12:56:40.047	2.75x	-44.03	42609.15	9.77			
alpha	E	2029-10-16T13:00:12.237	3.37x	-44.25	44695.49	9.89			
beta	E	2029-10-16T13:01:51.410	3.66x	-44.34	45678.47	9.94			
eta	E	2029-10-16T13:04:21.551	4.10x	-44.49	47176.12	10.01			
gamma	E	2029-10-16T13:05:06.955	4.23x	-44.53	47631.13	10.03			
delta	E	2029-10-16T13:06:13.572	4.42x	-44.59	48300.35	10.06			
lambda	E	2029-10-16T13:09:04.583	4.91x	-44.73	50026.71	10.13			
epsilon	E	2029-10-16T13:10:18.966	5.13	-44.79	50781.17	10.14			