

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-19T10:38:52.630
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3425571052347914752
 2Mass ID (if available) : 06164754+2339184

ICRS Star Coord at Epoch: 06h 16m 47.55018s +23:39:18.56332s

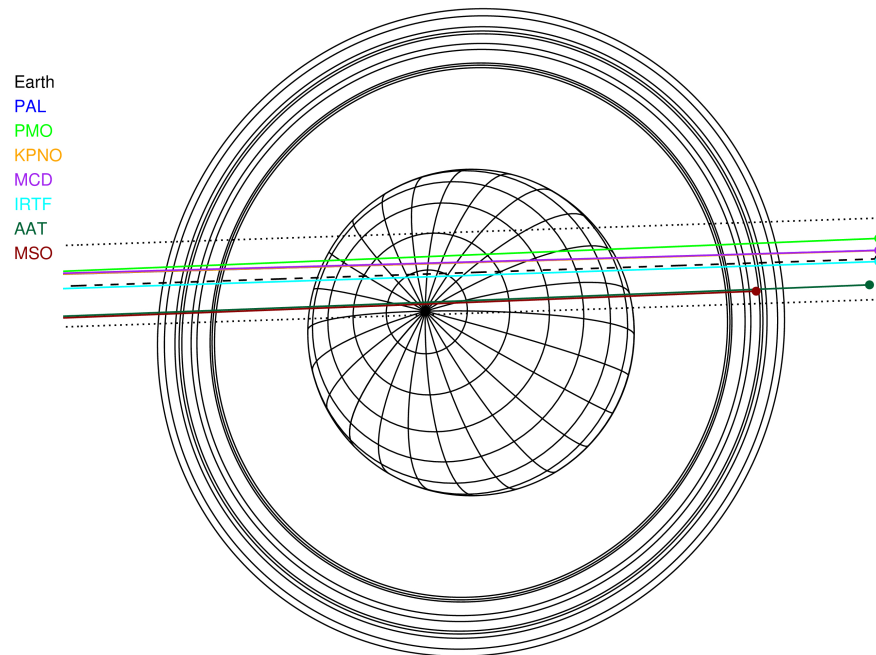
RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.524
 G magnitude : 17.124
 RP magnitude : 16.286
 BP magnitude : 17.829
 DUPflag : 0
 Distance (au) : 17.977
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.22
 Sun-Target sep (deg) : 173.51
 Sun-Moon sep (deg) : 146.39
 B (ring opening deg) : 71.98
 PA of pole (deg) : 64.99

#	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



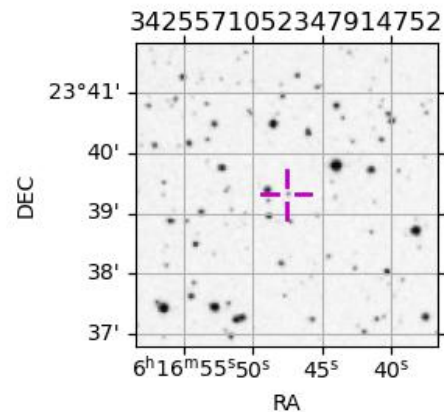
2033-12-19T10:38:52.6300 ra: 06 16 47.55018 s: +23 39 18.563 C/A 0.728° PA 181.92 deg v_sky -23.22 km/s D 17.98 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2033-12-19T10:38:52 K14.52 G17.12 PgtRgt

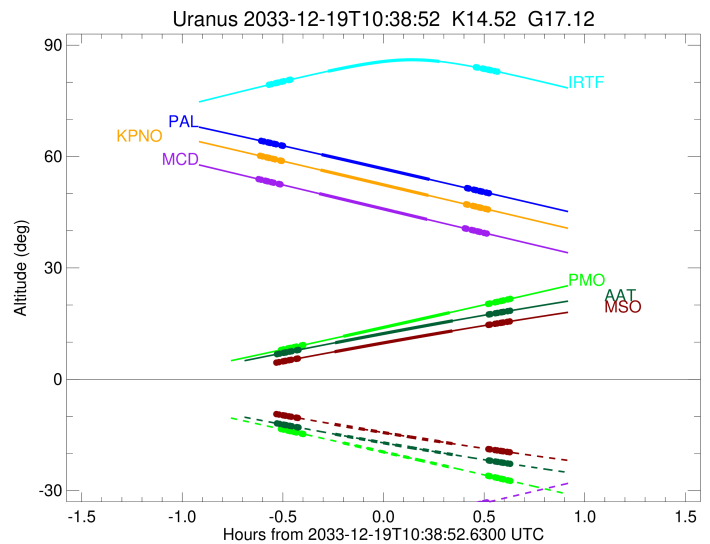
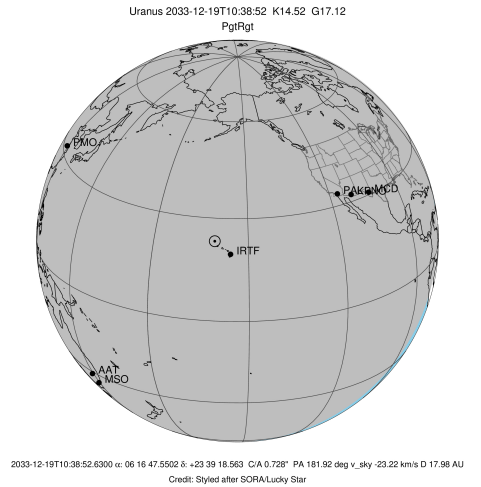


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	+++++	+ +	+++++	DEC 19 10:02 - DEC 19 11:10	PieRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	DEC 19 10:08 - DEC 19 11:16	PieRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	DEC 19 10:02 - DEC 19 11:10	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	DEC 19 10:01 - DEC 19 11:09	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	DEC 19 10:04 - DEC 19 11:12	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	+++++	+ +	+++++	DEC 19 10:07 - DEC 19 11:16	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+ +	+++++	DEC 19 10:10 - DEC 19 11:16	PieRie

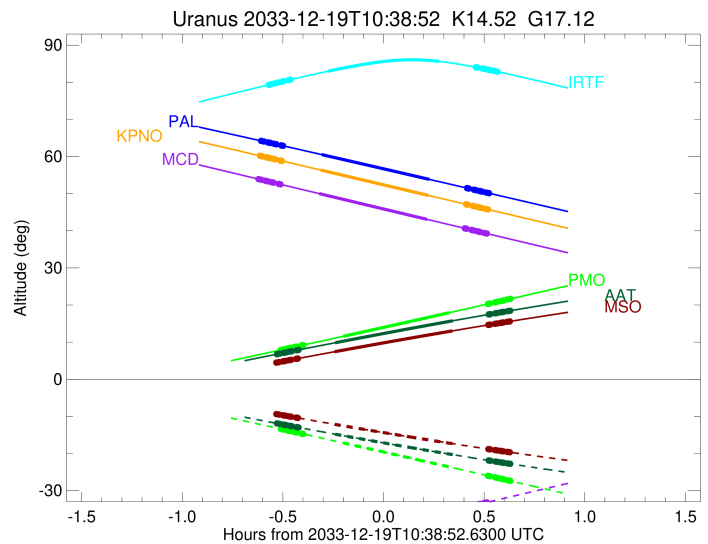
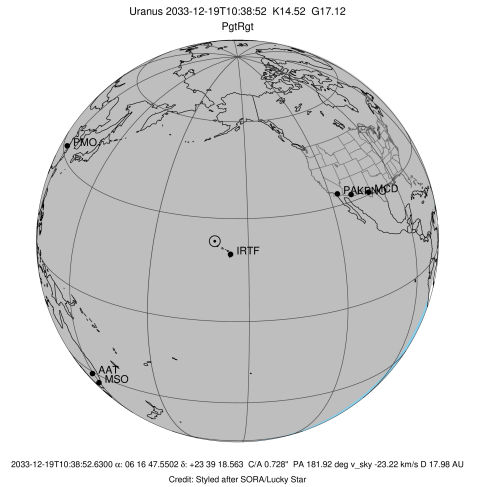


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-19T10:36:38.180
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3425571052347914752
 2Mass ID (if available) : 06164754+2339184
 ICRS Star Coord at Epoch: 06h 16m 47.55018s +23:39:18.56332s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.524
 G magnitude : 17.124
 RP magnitude : 16.286
 BP magnitude : 17.829
 DUPflag : 0
 Distance (au) : 17.977
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.22
 Sun-Target sep (deg) : 173.51
 Sun-Moon sep (deg) : 147.21
 B (ring opening deg) : 71.98
 PA of pole (deg) : 64.99
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.841
 C/A sky separation (km) : 10965.2
 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



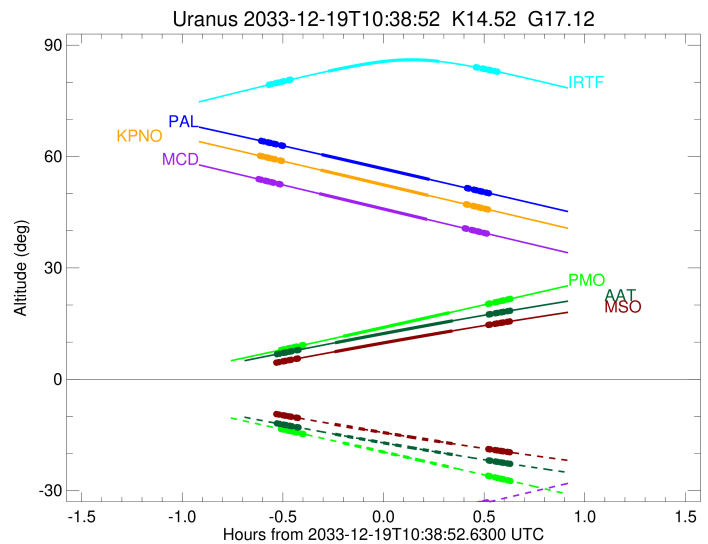
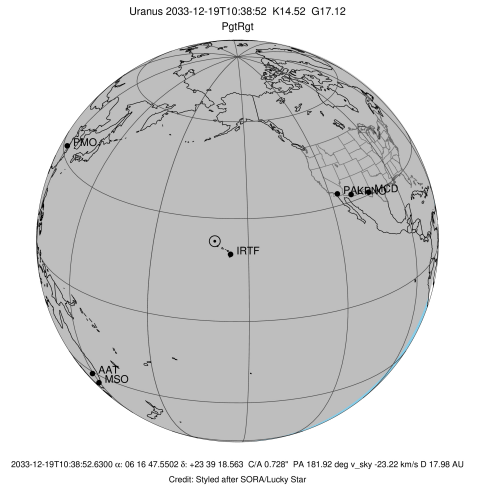
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-19T10:02:37.096		64.17	-58.25	50839.94	-23.91		
lambda	I	2033-12-19T10:03:11.079		64.06	-58.14	50026.71	-23.92		
delta	I	2033-12-19T10:04:23.319		63.81	-57.89	48300.35	-23.87		
gamma	I	2033-12-19T10:04:51.562		63.72	-57.79	47626.37	-23.85		
eta	I	2033-12-19T10:05:10.442		63.65	-57.73	47176.12	-23.84		
beta	I	2033-12-19T10:06:13.303		63.44	-57.51	45678.60	-23.79		
alpha	I	2033-12-19T10:06:53.968		63.30	-57.37	44711.91	-23.76		
4	I	2033-12-19T10:08:26.330		62.99	-57.05	42526.14	-23.68		
5	I	2033-12-19T10:08:36.278		62.95	-57.01	42276.94	-23.65		
6	I	2033-12-19T10:08:54.747		62.89	-56.95	41838.22	-23.65		
Uranus	I	2033-12-19T10:20:26.908		60.52	-54.56	25357.23		-10.90	-11.41
Uranus	E	2033-12-19T10:52:34.647		53.84	-47.85	25029.75		18.02	18.81
6	E	2033-12-19T11:03:47.905		51.49	-45.50	41858.12	23.59		
5	E	2033-12-19T11:04:00.847		51.45	-45.46	42164.09	23.59		
4	E	2033-12-19T11:04:19.136		51.38	-45.39	42612.36	23.62		
alpha	E	2033-12-19T11:05:49.123		51.07	-45.08	44740.31	23.71		
beta	E	2033-12-19T11:06:27.606		50.93	-44.94	45650.45	23.74		
eta	E	2033-12-19T11:07:31.785		50.71	-44.72	47176.12	23.78		
gamma	E	2033-12-19T11:07:50.605		50.64	-44.65	47623.77	23.79		
delta	E	2033-12-19T11:08:19.030		50.55	-44.56	48300.35	23.81		
lambda	E	2033-12-19T11:09:31.462		50.29	-44.30	50026.71	23.86		
epsilon	E	2033-12-19T11:10:25.360		50.10	-44.12	51313.30	23.85		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-19T10:42:53.410
 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 : 3425571052347914752
 2Mass ID (if available) : 06164754+2339184
 ICRS Star Coord at Epoch: 06h 16m 47.55018s +23:39:18.56332s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.524
 G magnitude : 17.124
 RP magnitude : 16.286
 BP magnitude : 17.829
 DUPflag : 0
 Distance (au) : 17.977
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.22
 Sun-Target sep (deg) : 173.51
 Sun-Moon sep (deg) : 145.91
 B (ring opening deg) : 71.98
 PA of pole (deg) : 64.99
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.932
 C/A sky separation (km) : 12147.6
 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



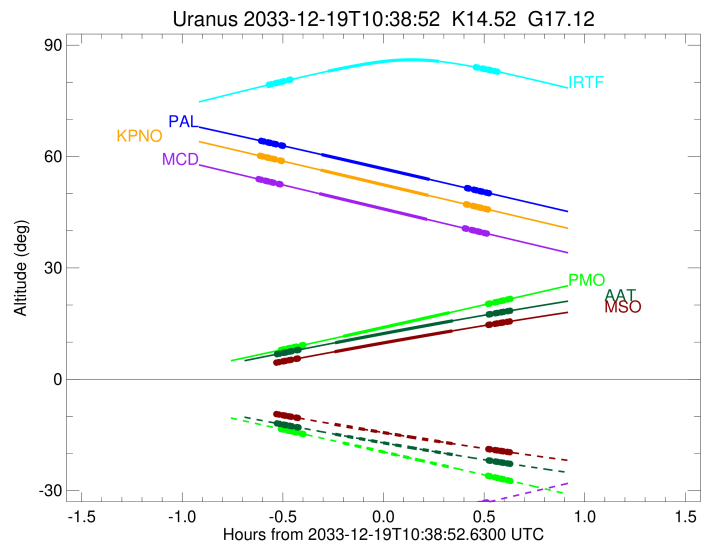
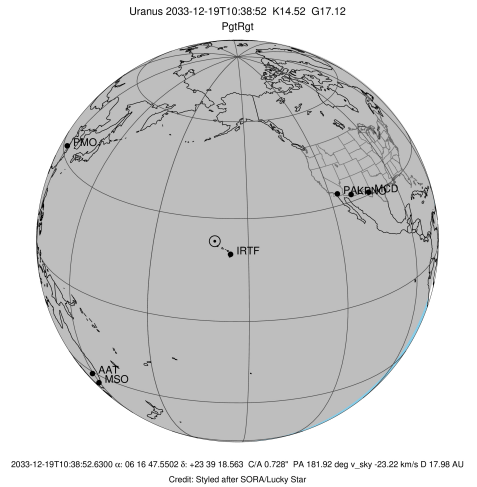
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-19T10:08:32.144		7.95	-13.46	50831.07	-23.39		
lambda	I	2033-12-19T10:09:06.512		8.06	-13.57	50026.71	-23.39		
delta	I	2033-12-19T10:10:20.395		8.30	-13.82	48300.35	-23.34		
gamma	I	2033-12-19T10:10:49.294		8.40	-13.91	47626.17	-23.32		
eta	I	2033-12-19T10:11:08.602		8.46	-13.98	47176.12	-23.30		
beta	I	2033-12-19T10:12:12.916		8.67	-14.19	45678.96	-23.25		
alpha	I	2033-12-19T10:12:54.496		8.81	-14.33	44713.18	-23.21		
4	I	2033-12-19T10:14:29.136		9.12	-14.65	42526.34	-23.11		
5	I	2033-12-19T10:14:39.480		9.15	-14.68	42274.18	-23.08		
6	I	2033-12-19T10:14:58.210		9.21	-14.75	41839.93	-23.08		
Uranus	I	2033-12-19T10:26:53.836		11.58	-17.15	25389.05		-9.99	-10.45
Uranus	E	2033-12-19T10:58:34.222		17.95	-23.63	25030.14		18.01	18.81
6	E	2033-12-19T11:10:04.443		20.30	-26.00	41858.82	23.17		
5	E	2033-12-19T11:10:17.562		20.34	-26.05	42163.39	23.18		
4	E	2033-12-19T11:10:36.197		20.41	-26.11	42611.99	23.21		
alpha	E	2033-12-19T11:12:07.763		20.72	-26.43	44740.75	23.32		
beta	E	2033-12-19T11:12:46.878		20.85	-26.57	45650.73	23.35		
eta	E	2033-12-19T11:13:52.073		21.08	-26.79	47176.12	23.41		
gamma	E	2033-12-19T11:14:11.184		21.14	-26.86	47623.70	23.43		
delta	E	2033-12-19T11:14:40.049		21.24	-26.96	48300.35	23.45		
lambda	E	2033-12-19T11:15:53.565		21.49	-27.21	50026.71	23.51		
epsilon	E	2033-12-19T11:16:48.034		21.68	-27.40	51308.41	23.51		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-19T10:36:19.290
 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 : 3425571052347914752
 2Mass ID (if available) : 06164754+2339184
 ICRS Star Coord at Epoch: 06h 16m 47.55018s +23:39:18.56332s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.524
 G magnitude : 17.124
 RP magnitude : 16.286
 BP magnitude : 17.829
 DUPflag : 0
 Distance (au) : 17.977
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.22
 Sun-Target sep (deg) : 173.51
 Sun-Moon sep (deg) : 147.24
 B (ring opening deg) : 71.98
 PA of pole (deg) : 64.99
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.840
 C/A sky separation (km) : 10957.6
 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	2033-12-19T10:02:16.849		60.15	-54.06	50840.11	-23.90		
lambda	I	2033-12-19T10:02:50.856		60.03	-53.94	50026.71	-23.91		
delta	I	2033-12-19T10:04:03.132		59.78	-53.68	48300.35	-23.86		
gamma	I	2033-12-19T10:04:31.389		59.68	-53.58	47626.37	-23.84		
eta	I	2033-12-19T10:04:50.278		59.61	-53.51	47176.12	-23.83		
beta	I	2033-12-19T10:05:53.172		59.39	-53.29	45678.59	-23.78		
alpha	I	2033-12-19T10:06:33.858		59.25	-53.15	44711.88	-23.75		
4	I	2033-12-19T10:08:06.267		58.92	-52.82	42526.13	-23.67		
5	I	2033-12-19T10:08:16.218		58.88	-52.79	42276.99	-23.64		
6	I	2033-12-19T10:08:34.699		58.82	-52.72	41838.19	-23.63		
Uranus	I	2033-12-19T10:20:07.185		56.37	-50.27	25356.80		-10.91	-11.42
Uranus	E	2033-12-19T10:52:16.679		49.52	-43.44	25029.75		18.02	18.81
6	E	2033-12-19T11:03:30.458		47.13	-41.06	41858.13	23.57		
5	E	2033-12-19T11:03:43.410		47.09	-41.02	42164.08	23.57		
4	E	2033-12-19T11:04:01.715		47.02	-40.95	42612.35	23.60		
alpha	E	2033-12-19T11:05:31.779		46.70	-40.63	44740.32	23.69		
beta	E	2033-12-19T11:06:10.295		46.56	-40.50	45650.45	23.72		
eta	E	2033-12-19T11:07:14.531		46.34	-40.27	47176.12	23.76		
gamma	E	2033-12-19T11:07:33.366		46.27	-40.21	47623.77	23.77		
delta	E	2033-12-19T11:08:01.816		46.17	-40.11	48300.35	23.79		
lambda	E	2033-12-19T11:09:14.313		45.91	-39.85	50026.71	23.83		
epsilon	E	2033-12-19T11:10:08.255		45.72	-39.66	51313.18	23.83		

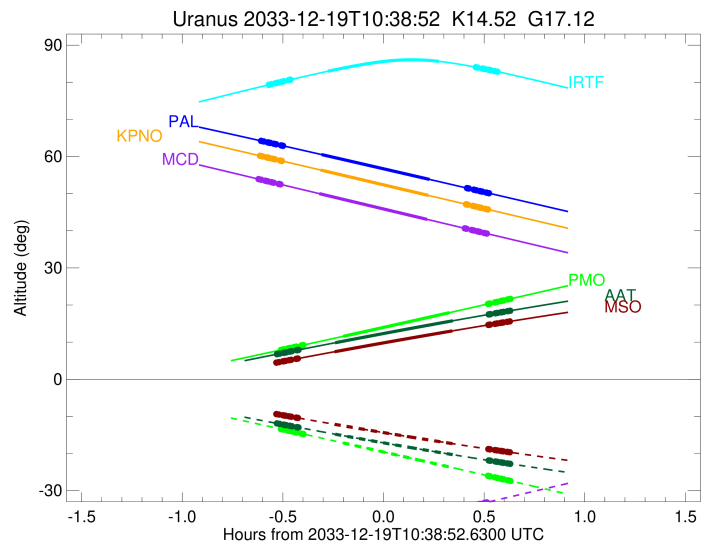
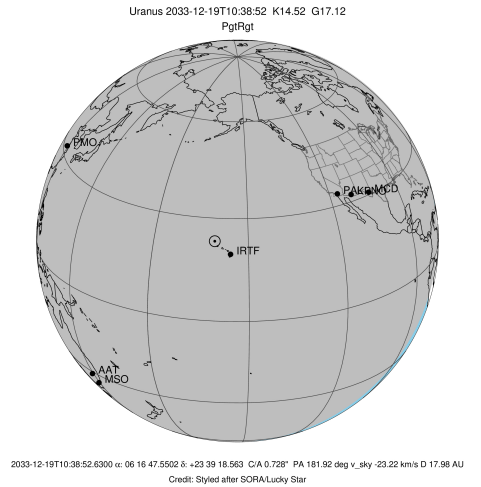
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-19T10:35:55.110
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 3425571052347914752
 2Mass ID (if available) : 06164754+2339184
 ICRS Star Coord at Epoch: 06h 16m 47.55018s +23:39:18.56332s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.524
 G magnitude : 17.124
 RP magnitude : 16.286
 BP magnitude : 17.829
 DUPflag : 0
 Distance (au) : 17.977
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.22
 Sun-Target sep (deg) : 173.51
 Sun-Moon sep (deg) : 147.27
 B (ring opening deg) : 71.98
 PA of pole (deg) : 64.99
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.847
 C/A sky separation (km) : 11046.2
 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	2033-12-19T10:01:50.787		53.87	-47.68	50839.82	-23.86		
lambda	I	2033-12-19T10:02:24.834		53.75	-47.55	50026.71	-23.87		
delta	I	2033-12-19T10:03:37.224		53.49	-47.30	48300.35	-23.82		
gamma	I	2033-12-19T10:04:05.526		53.39	-47.19	47626.36	-23.80		
eta	I	2033-12-19T10:04:24.445		53.32	-47.13	47176.12	-23.79		
beta	I	2033-12-19T10:05:27.441		53.09	-46.90	45678.61	-23.74		
alpha	I	2033-12-19T10:06:08.194		52.94	-46.75	44711.93	-23.71		
4	I	2033-12-19T10:07:40.764		52.61	-46.42	42526.14	-23.63		
5	I	2033-12-19T10:07:50.738		52.58	-46.39	42276.89	-23.59		
6	I	2033-12-19T10:08:09.245		52.51	-46.32	41838.26	-23.59		
Uranus	I	2033-12-19T10:19:43.419		50.01	-43.83	25358.44		-10.87	-11.37
Uranus	E	2033-12-19T10:51:52.073		43.08	-36.95	25029.70		18.02	18.81
6	E	2033-12-19T11:03:07.599		40.66	-34.55	41858.23	23.52		
5	E	2033-12-19T11:03:20.572		40.61	-34.51	42163.97	23.52		
4	E	2033-12-19T11:03:38.920		40.54	-34.44	42612.30	23.55		
alpha	E	2033-12-19T11:05:09.183		40.22	-34.12	44740.39	23.64		
beta	E	2033-12-19T11:05:47.781		40.08	-33.98	45650.50	23.66		
eta	E	2033-12-19T11:06:52.150		39.85	-33.76	47176.12	23.71		
gamma	E	2033-12-19T11:07:11.025		39.79	-33.69	47623.76	23.72		
delta	E	2033-12-19T11:07:39.535		39.68	-33.59	48300.35	23.74		
lambda	E	2033-12-19T11:08:52.181		39.42	-33.33	50026.71	23.79		
epsilon	E	2033-12-19T11:09:46.197		39.23	-33.14	51312.30	23.78		

```

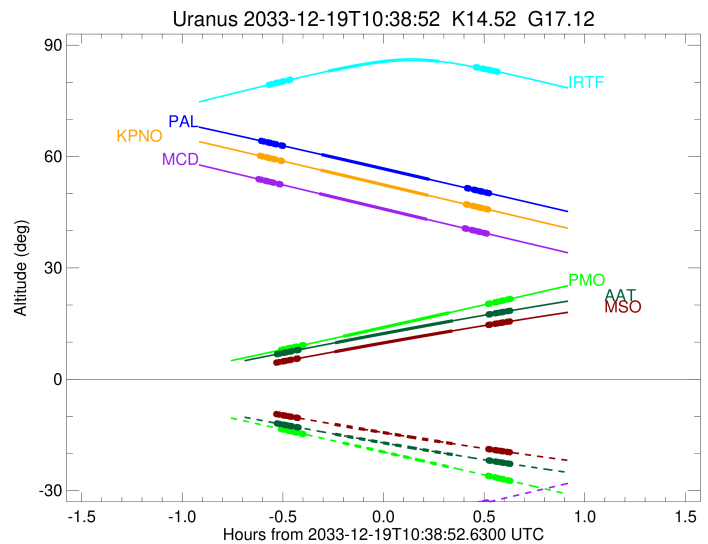
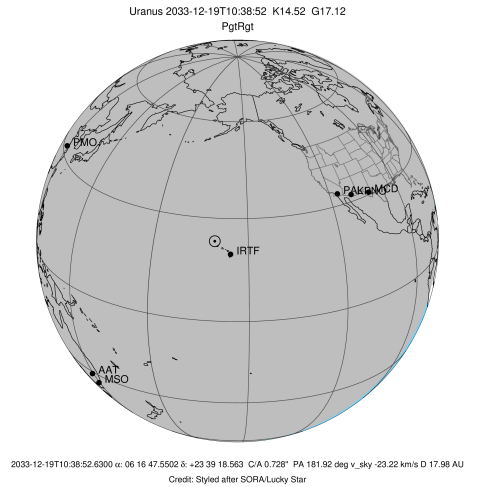
target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-12-19T10:39:01.150
Event type           : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code        : IRTF
Location             : Mauna Kea/IRTF
Latitude (deg)       : 19.82622
E. Longitude (deg)   : 204.52800
Altitude (km)        : 4.168
Gaia source ID       : 3425571052347914752
2Mass ID (if available) : 06164754+2339184
ICRS Star Coord at Epoch: 06h 16m 47.55018s +23:39:18.56332s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 14.524
G magnitude          : 17.124
RP magnitude         : 16.286
BP magnitude         : 17.829
DUPflag              : 0
Distance (au)        : 17.977
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.22
Sun-Target sep (deg) : 173.51
Sun-Moon sep (deg)   : 146.86
B (ring opening deg) : 71.98
PA of pole (deg)     : 64.99
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.686
C/A sky separation (km) : 8942.3
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_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	2033-12-19T10:04:55.188		79.37	-85.05	50849.81	-24.20		
lambda	I	2033-12-19T10:05:29.172		79.50	-85.14	50026.71	-24.21		
delta	I	2033-12-19T10:06:40.513		79.75	-85.31	48300.35	-24.18		
gamma	I	2033-12-19T10:07:08.381		79.85	-85.37	47626.57	-24.17		
eta	I	2033-12-19T10:07:27.020		79.92	-85.42	47176.12	-24.16		
beta	I	2033-12-19T10:08:29.038		80.14	-85.55	45678.17	-24.13		
alpha	I	2033-12-19T10:09:09.171		80.28	-85.64	44710.48	-24.11		
4	I	2033-12-19T10:10:40.077		80.60	-85.81	42525.99	-24.06		
5	I	2033-12-19T10:10:49.709		80.64	-85.83	42280.04	-24.03		
6	I	2033-12-19T10:11:08.092		80.70	-85.86	41836.25	-24.03		
Uranus	I	2033-12-19T10:22:20.122		82.98	-86.21	25314.27		-12.04	-12.59
Uranus	E	2033-12-19T10:55:29.509		85.63	-80.75	25035.21		17.92	18.71
6	E	2033-12-19T11:06:25.114		84.06	-78.38	41856.09	24.04		
5	E	2033-12-19T11:06:37.979		84.02	-78.34	42166.18	24.04		
4	E	2033-12-19T11:06:55.877		83.97	-78.27	42613.31	24.06		
alpha	E	2033-12-19T11:08:24.199		83.71	-77.94	44738.97	24.12		
beta	E	2033-12-19T11:09:02.041		83.59	-77.81	45649.62	24.14		
eta	E	2033-12-19T11:10:05.203		83.39	-77.57	47176.12	24.17		
gamma	E	2033-12-19T11:10:23.731		83.34	-77.50	47623.99	24.18		
delta	E	2033-12-19T11:10:51.697		83.25	-77.40	48300.35	24.19		
lambda	E	2033-12-19T11:12:03.016		83.02	-77.14	50026.71	24.22		
epsilon	E	2033-12-19T11:12:56.785		82.85	-76.94	51329.62	24.21		

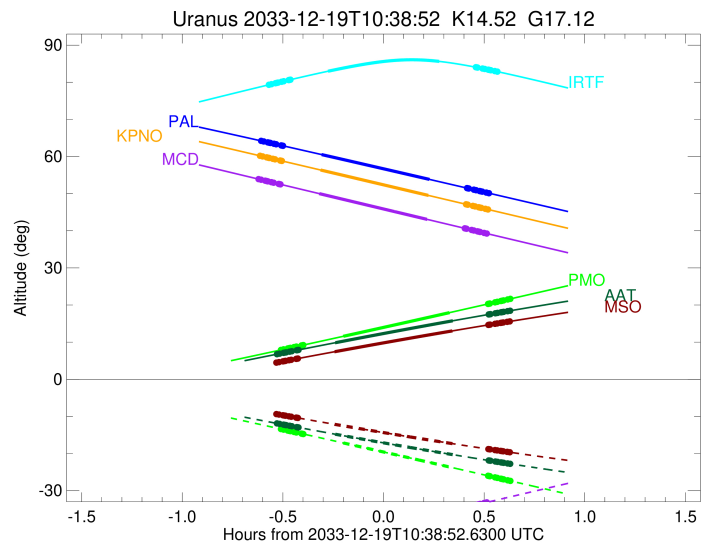
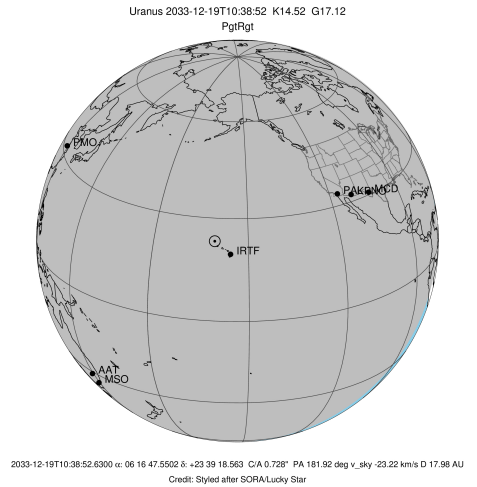
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-12-19T10:42:03.520
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       : 3425571052347914752
2Mass ID (if available) : 06164754+2339184
ICRS Star Coord at Epoch: 06h 16m 47.55018s +23:39:18.56332s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 14.524
G magnitude          : 17.124
RP magnitude         : 16.286
BP magnitude         : 17.829
DUPflag              : 0
Distance (au)        : 17.977
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.22
Sun-Target sep (deg) : 173.51
Sun-Moon sep (deg)  : 145.91
B (ring opening deg) : 71.98
PA of pole (deg)    : 64.99
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.384
C/A sky separation (km) : 5004.2
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_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	2033-12-19T10:07:19.041		6.79	-11.92	50870.68	-24.21		
lambda	I	2033-12-19T10:07:53.890		6.90	-12.02	50026.71	-24.22		
delta	I	2033-12-19T10:09:05.190		7.11	-12.22	48300.35	-24.21		
gamma	I	2033-12-19T10:09:33.007		7.19	-12.30	47626.99	-24.21		
eta	I	2033-12-19T10:09:51.634		7.25	-12.36	47176.12	-24.20		
beta	I	2033-12-19T10:10:53.554		7.44	-12.53	45677.22	-24.20		
alpha	I	2033-12-19T10:11:33.661		7.55	-12.64	44707.72	-24.19		
4	I	2033-12-19T10:13:04.070		7.82	-12.90	42525.97	-24.18		
5	I	2033-12-19T10:13:13.372		7.85	-12.93	42285.84	-24.16		
6	I	2033-12-19T10:13:32.064		7.91	-12.98	41832.39	-24.16		
Uranus	I	2033-12-19T10:24:27.962		9.84	-14.80	25232.52		-13.97	-14.61
Uranus	E	2033-12-19T10:59:30.722		15.75	-20.30	25067.37		17.33	18.09
6	E	2033-12-19T11:10:15.777		17.46	-21.87	41852.11	24.25		
5	E	2033-12-19T11:10:28.865		17.50	-21.90	42170.69	24.25		
4	E	2033-12-19T11:10:46.486		17.54	-21.95	42614.79	24.27		
alpha	E	2033-12-19T11:12:14.009		17.77	-22.15	44736.29	24.29		
beta	E	2033-12-19T11:12:51.631		17.87	-22.24	45648.13	24.29		
eta	E	2033-12-19T11:13:54.489		18.03	-22.39	47176.12	24.30		
gamma	E	2033-12-19T11:14:12.935		18.08	-22.44	47624.44	24.31		
delta	E	2033-12-19T11:14:40.742		18.15	-22.50	48300.35	24.31		
lambda	E	2033-12-19T11:15:51.739		18.34	-22.67	50026.71	24.32		
epsilon	E	2033-12-19T11:16:46.534		18.48	-22.80	51359.62	24.31		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-19T10:41:54.280
 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 : 3425571052347914752
 2Mass ID (if available) : 06164754+2339184
 ICRS Star Coord at Epoch: 06h 16m 47.55018s +23:39:18.56332s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.524
 G magnitude : 17.124
 RP magnitude : 16.286
 BP magnitude : 17.829
 DUPflag : 0
 Distance (au) : 17.977
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.22
 Sun-Target sep (deg) : 173.51
 Sun-Moon sep (deg) : 145.90
 B (ring opening deg) : 71.98
 PA of pole (deg) : 64.99
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.362
 C/A sky separation (km) : 4725.9
 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_itrff93_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	2033-12-19T10:07:08.256		4.52x	-9.41	50872.38	-24.21		
lambda	I	2033-12-19T10:07:43.168		4.62x	-9.51	50026.71	-24.22		
delta	I	2033-12-19T10:08:54.452		4.82x	-9.70	48300.35	-24.21		
gamma	I	2033-12-19T10:09:22.260		4.90x	-9.77	47627.02	-24.21		
eta	I	2033-12-19T10:09:40.884		4.96x	-9.82	47176.12	-24.21		
beta	I	2033-12-19T10:10:42.789		5.13	-9.99	45677.15	-24.20		
alpha	I	2033-12-19T10:11:22.889		5.25	-10.10	44707.51	-24.20		
4	I	2033-12-19T10:12:53.255		5.50	-10.34	42525.98	-24.19		
5	I	2033-12-19T10:13:02.533		5.53	-10.36	42286.27	-24.17		
6	I	2033-12-19T10:13:21.247		5.58	-10.41	41832.09	-24.17		
Uranus	I	2033-12-19T10:24:16.185		7.41	-12.13	25226.67		-14.10	-14.74
Uranus	E	2033-12-19T10:59:24.467		13.03	-17.34	25070.41		17.27	18.03
6	E	2033-12-19T11:10:09.183		14.65	-18.81	41851.85	24.26		
5	E	2033-12-19T11:10:22.290		14.68	-18.84	42171.01	24.26		
4	E	2033-12-19T11:10:39.897		14.72	-18.88	42614.87	24.27		
alpha	E	2033-12-19T11:12:07.393		14.94	-19.07	44736.12	24.29		
beta	E	2033-12-19T11:12:45.011		15.03	-19.16	45648.04	24.29		
eta	E	2033-12-19T11:13:47.866		15.18	-19.30	47176.12	24.30		
gamma	E	2033-12-19T11:14:06.311		15.23	-19.34	47624.46	24.31		
delta	E	2033-12-19T11:14:34.114		15.30	-19.40	48300.35	24.31		
lambda	E	2033-12-19T11:15:45.108		15.47	-19.55	50026.71	24.32		
epsilon	E	2033-12-19T11:16:39.978		15.60	-19.67	51361.47	24.31		