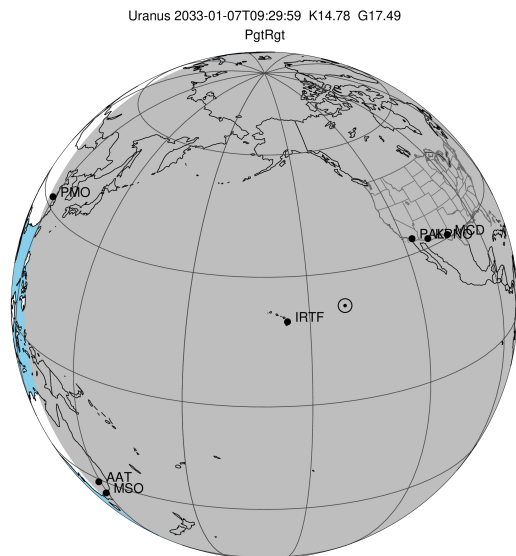


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-07T09:29:59.040
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427825772742319360
 2Mass ID (if available) : 05530815+2338435

ICRS Star Coord at Epoch: 05h 53m 08.15523s +23:38:43.52570s

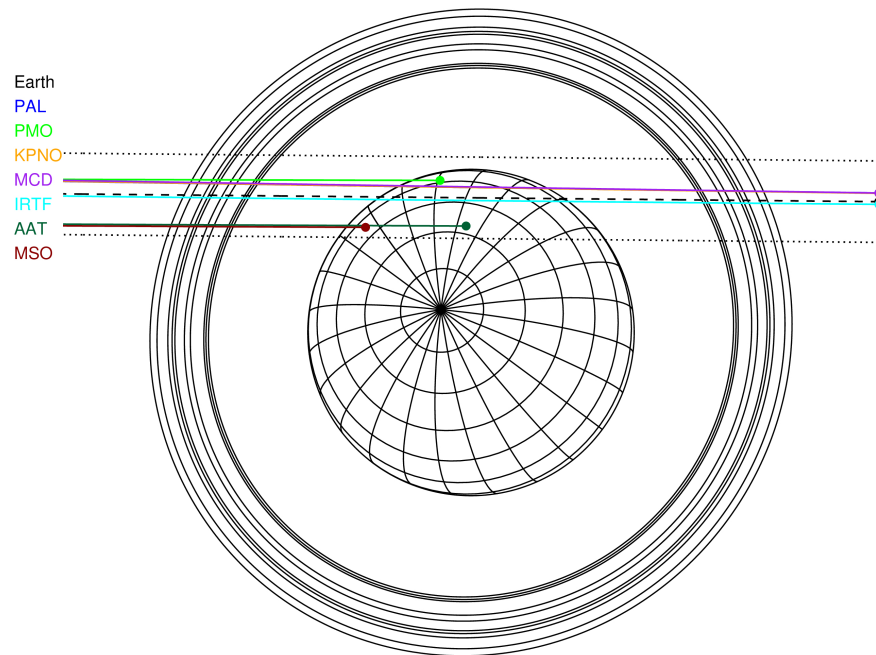
RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.779
 G magnitude : 17.495
 RP magnitude : 16.628
 BP magnitude : 18.231
 DUPflag : 0
 Distance (au) : 18.081
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.88
 Sun-Target sep (deg) : 161.49
 Sun-Moon sep (deg) : 81.27
 B (ring opening deg) : 76.64
 PA of pole (deg) : 52.65

#	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



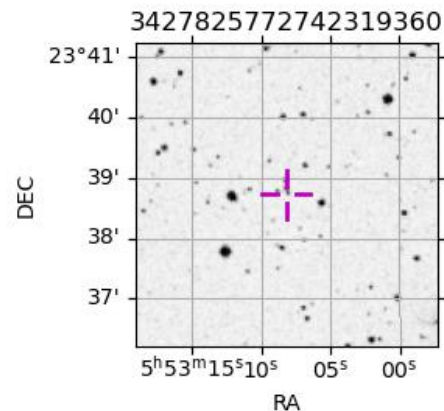
2033-01-07T09:29:59.0400 ra: 05 53 08.15523 s: +23 38 43.526 C/A 1.616° PA 179.45 deg v_sky -21.88 km/s D 18.08 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2033-01-07T09:29:59 K14.78 G17.49 PgtRgt

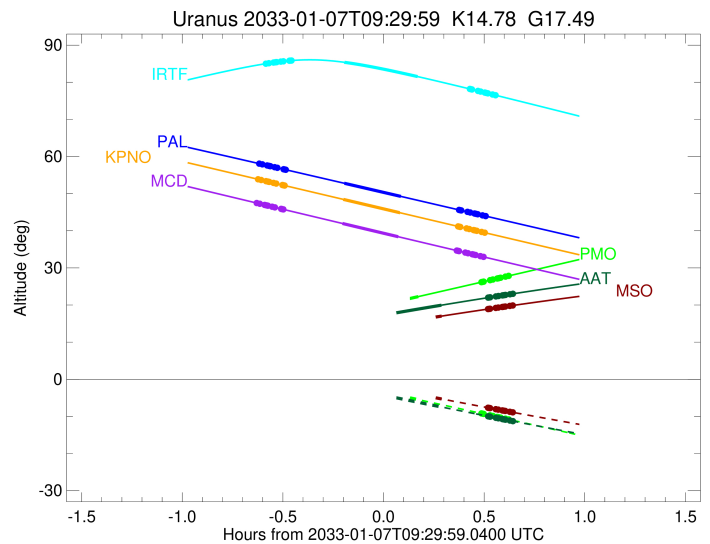
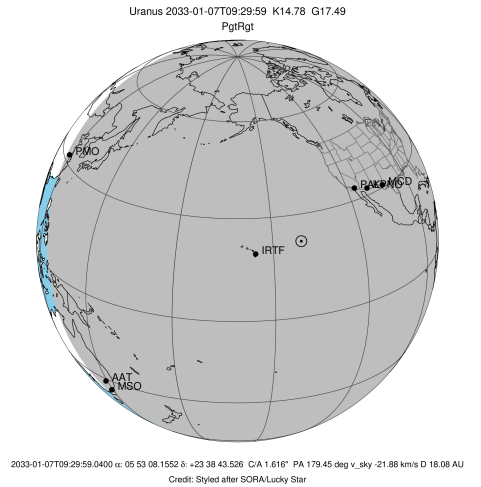


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++	+ +	+++++	JAN 07 08:52 - JAN 07 10:00	PieRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8		+	+++++	JAN 07 09:40 - JAN 07 10:07	PneRne
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	JAN 07 08:52 - JAN 07 10:00	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	JAN 07 08:52 - JAN 07 10:00	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	JAN 07 08:54 - JAN 07 10:03	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		+	+++++	JAN 07 09:47 - JAN 07 10:08	PneRne
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0		+	+++++	JAN 07 09:47 - JAN 07 10:08	PneRne

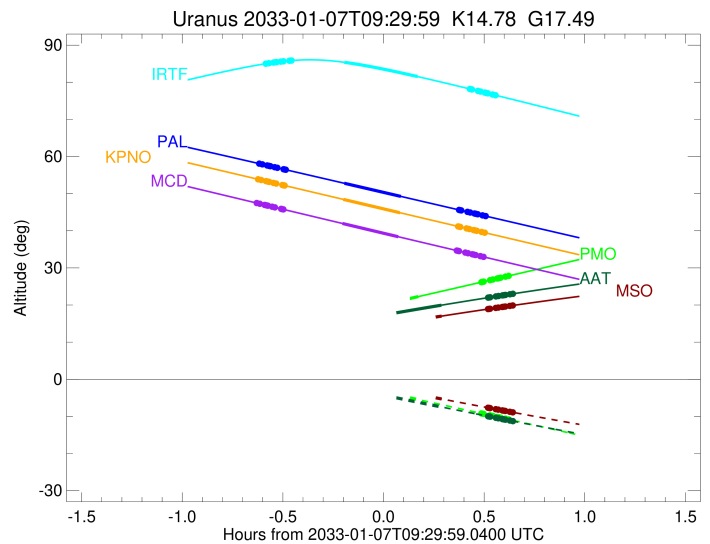
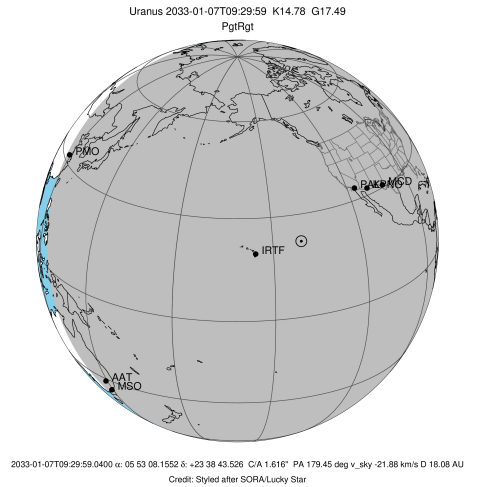


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-07T09:27:06.200
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3427825772742319360
 2Mass ID (if available) : 05530815+2338435
 ICRS Star Coord at Epoch: 05h 53m 08.15523s +23:38:43.52570s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.779
 G magnitude : 17.495
 RP magnitude : 16.628
 BP magnitude : 18.231
 DUPflag : 0
 Distance (au) : 18.081
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.88
 Sun-Target sep (deg) : 161.49
 Sun-Moon sep (deg) : 82.10
 B (ring opening deg) : 76.64
 PA of pole (deg) : 52.65
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.732
 C/A sky separation (km) : 22715.6
 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	2033-01-07T08:52:58.577		58.08	-73.01	51112.09	-20.28		
lambda	I	2033-01-07T08:53:52.449		57.89	-72.86	50026.71	-20.09		
delta	I	2033-01-07T08:55:18.797		57.59	-72.61	48300.35	-19.89		
gamma	I	2033-01-07T08:55:52.489		57.48	-72.51	47631.50	-19.81		
eta	I	2033-01-07T08:56:15.511		57.40	-72.45	47176.12	-19.75		
beta	I	2033-01-07T08:57:31.739		57.13	-72.23	45678.38	-19.55		
alpha	I	2033-01-07T08:58:19.887		56.97	-72.09	44740.93	-19.41		
4	I	2033-01-07T09:00:10.422		56.58	-71.76	42613.30	-19.04		
5	I	2033-01-07T09:00:29.837		56.51	-71.71	42249.49	-19.00		
6	I	2033-01-07T09:00:53.793		56.43	-71.64	41796.20	-18.89		
Uranus	I	2033-01-07T09:18:19.424		52.79	-68.43	25543.99		2.14	2.25
Uranus	E	2033-01-07T09:35:10.535		49.26	-65.16	25125.11		11.75	12.30
6	E	2033-01-07T09:52:30.206		45.62	-61.70	41843.35	18.83		
5	E	2033-01-07T09:52:54.060		45.54	-61.62	42301.00	18.94		
4	E	2033-01-07T09:53:07.019		45.49	-61.57	42538.34	18.98		
alpha	E	2033-01-07T09:55:01.230		45.09	-61.19	44730.33	19.35		
beta	E	2033-01-07T09:55:49.393		44.93	-61.02	45661.60	19.48		
eta	E	2033-01-07T09:57:06.707		44.66	-60.76	47176.12	19.68		
gamma	E	2033-01-07T09:57:29.442		44.58	-60.69	47624.23	19.74		
delta	E	2033-01-07T09:58:03.625		44.46	-60.57	48300.35	19.82		
lambda	E	2033-01-07T09:59:30.294		44.15	-60.28	50026.71	20.01		
epsilon	E	2033-01-07T10:00:43.279		43.90	-60.03	51492.91	20.20		

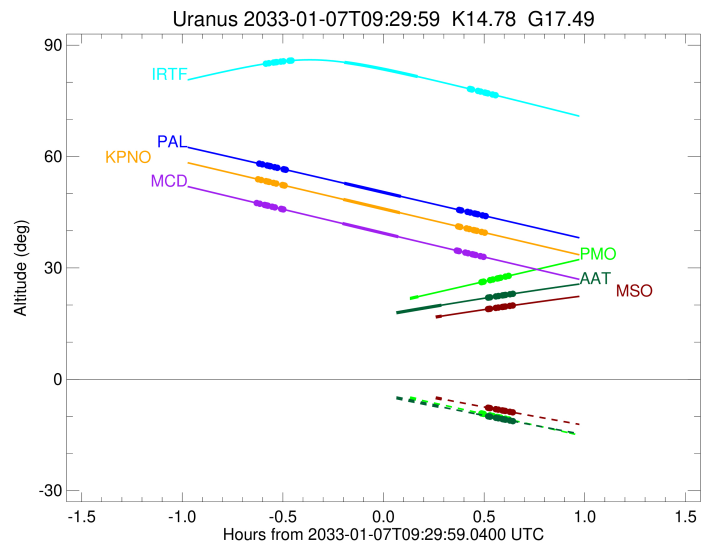
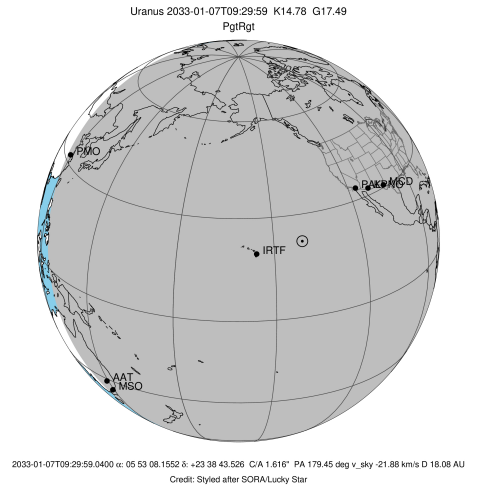
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-07T09:34:08.830
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3427825772742319360
 2Mass ID (if available) : 05530815+2338435
 ICRS Star Coord at Epoch: 05h 53m 08.15523s +23:38:43.52570s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.779
 G magnitude : 17.495
 RP magnitude : 16.628
 BP magnitude : 18.231
 DUPflag : 0
 Distance (au) : 18.081
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.88
 Sun-Target sep (deg) : 161.49
 Sun-Moon sep (deg) : 81.49
 B (ring opening deg) : 76.64
 PA of pole (deg) : 52.65
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.815
 C/A sky separation (km) : 23805.7
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-07T08:59:59.574		14.06	2.24x	51126.48	-19.75		
lambda	I	2033-01-07T09:00:55.667		14.25	2.06x	50026.71	-19.54		
delta	I	2033-01-07T09:02:24.475		14.54	1.79x	48300.35	-19.33		
gamma	I	2033-01-07T09:02:59.154		14.66	1.68x	47631.53	-19.24		
eta	I	2033-01-07T09:03:22.861		14.74	1.60x	47176.12	-19.18		
beta	I	2033-01-07T09:04:41.397		15.00	1.36x	45678.77	-18.96		
alpha	I	2033-01-07T09:05:31.032		15.17	1.20x	44741.94	-18.81		
4	I	2033-01-07T09:07:25.360		15.55	0.84x	42612.54	-18.40		
5	I	2033-01-07T09:07:45.194		15.62	0.78x	42252.86	-18.36		
6	I	2033-01-07T09:08:10.210		15.70	0.70x	41795.76	-18.24		
Uranus	I	2033-01-07T09:27:10.606		19.57	-2.93x	25514.95		3.68	3.85
Uranus	E	2033-01-07T09:40:21.352		22.27	-5.49	25172.53		11.07	11.58
6	E	2033-01-07T09:59:10.428		26.16	-9.20	41842.49	18.30		
5	E	2033-01-07T09:59:35.051		26.24	-9.28	42301.89	18.43		
4	E	2033-01-07T09:59:48.343		26.29	-9.32	42538.96	18.47		
alpha	E	2033-01-07T10:01:45.533		26.70	-9.71	44730.88	18.88		
beta	E	2033-01-07T10:02:34.842		26.87	-9.87	45661.93	19.03		
eta	E	2033-01-07T10:03:53.888		27.14	-10.14	47176.12	19.26		
gamma	E	2033-01-07T10:04:17.118		27.22	-10.21	47624.30	19.33		
delta	E	2033-01-07T10:04:52.016		27.34	-10.33	48300.35	19.42		
lambda	E	2033-01-07T10:06:20.416		27.65	-10.62	50026.71	19.64		
epsilon	E	2033-01-07T10:07:34.896		27.91	-10.87	51495.56	19.85		

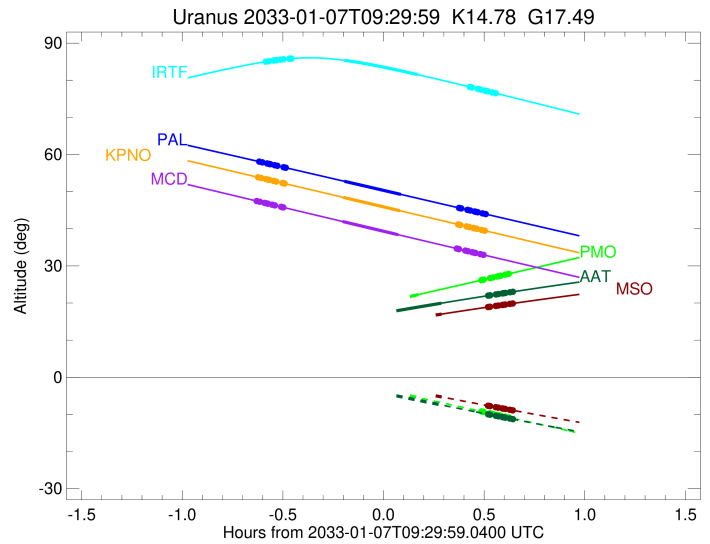
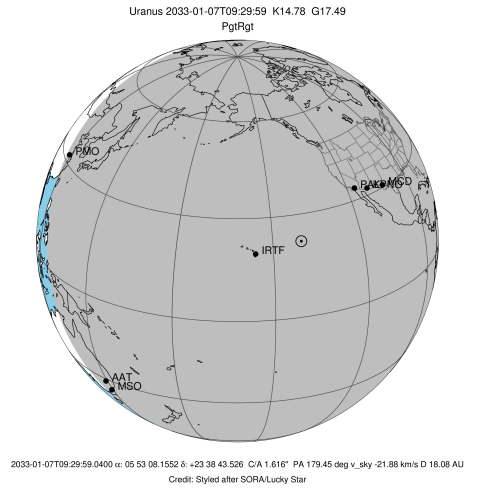
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-01-07T09:26:47.460
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      : 3427825772742319360
2Mass ID (if available) : 05530815+2338435
ICRS Star Coord at Epoch: 05h 53m 08.15523s +23:38:43.52570s
RUWE (>1.4 is poor) : 1.03
K magnitude         : 14.779
G magnitude         : 17.495
RP magnitude        : 16.628
BP magnitude        : 18.231
DUPflag            : 0
Distance (au)       : 18.081
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -21.88
Sun-Target sep (deg) : 161.49
Sun-Moon sep (deg)  : 82.06
B (ring opening deg) : 76.64
PA of pole (deg)    : 52.65
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.732
C/A sky separation (km) : 22711.3
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_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	2033-01-07T08:52:38.019		53.86	-69.89	51111.83	-20.27		
lambda	I	2033-01-07T08:53:31.915		53.67	-69.71	50026.71	-20.08		
delta	I	2033-01-07T08:54:58.323		53.37	-69.43	48300.35	-19.88		
gamma	I	2033-01-07T08:55:32.039		53.25	-69.32	47631.50	-19.80		
eta	I	2033-01-07T08:55:55.077		53.16	-69.24	47176.12	-19.74		
beta	I	2033-01-07T08:57:11.358		52.89	-68.99	45678.37	-19.53		
alpha	I	2033-01-07T08:57:59.540		52.72	-68.83	44740.92	-19.40		
4	I	2033-01-07T08:59:50.152		52.33	-68.47	42613.31	-19.02		
5	I	2033-01-07T09:00:09.585		52.26	-68.40	42249.44	-18.99		
6	I	2033-01-07T09:00:33.554		52.18	-68.32	41796.20	-18.87		
Uranus	I	2033-01-07T09:17:59.789		48.46	-64.80	25544.16		2.13	2.23
Uranus	E	2033-01-07T09:34:52.684		44.86	-61.31	25125.18		11.75	12.29
6	E	2033-01-07T09:52:13.171		41.18	-57.68	41843.33	18.81		
5	E	2033-01-07T09:52:37.052		41.09	-57.60	42301.01	18.92		
4	E	2033-01-07T09:52:50.023		41.05	-57.56	42538.35	18.96		
alpha	E	2033-01-07T09:54:44.351		40.64	-57.15	44730.35	19.33		
beta	E	2033-01-07T09:55:32.565		40.47	-56.99	45661.61	19.46		
eta	E	2033-01-07T09:56:49.960		40.20	-56.71	47176.12	19.66		
gamma	E	2033-01-07T09:57:12.719		40.12	-56.63	47624.23	19.72		
delta	E	2033-01-07T09:57:46.938		40.00	-56.51	48300.35	19.80		
lambda	E	2033-01-07T09:59:13.700		39.69	-56.21	50026.71	19.99		
epsilon	E	2033-01-07T10:00:26.769		39.43	-55.95	51493.00	20.18		

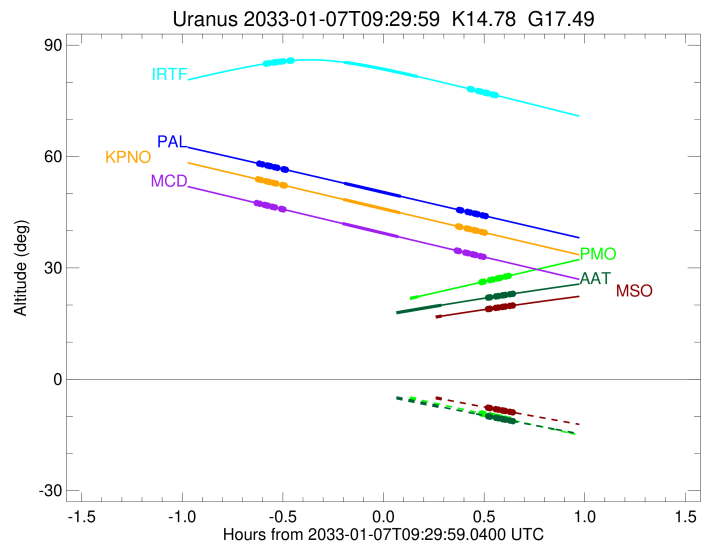
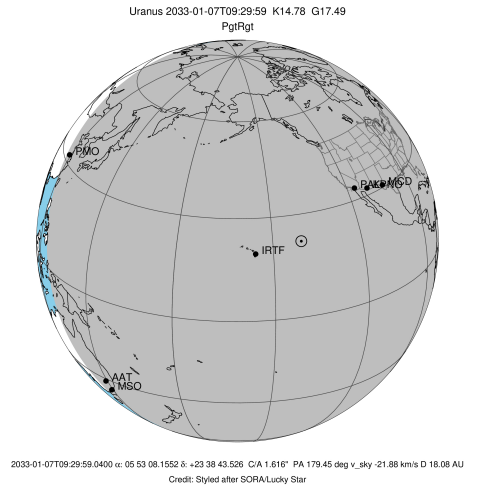
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-07T09:26:24.140
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 3427825772742319360
 2Mass ID (if available) : 05530815+2338435
 ICRS Star Coord at Epoch: 05h 53m 08.15523s +23:38:43.52570s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.779
 G magnitude : 17.495
 RP magnitude : 16.628
 BP magnitude : 18.231
 DUPflag : 0
 Distance (au) : 18.081
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.88
 Sun-Target sep (deg) : 161.49
 Sun-Moon sep (deg) : 81.99
 B (ring opening deg) : 76.64
 PA of pole (deg) : 52.65
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.739
 C/A sky separation (km) : 22804.0
 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_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	2033-01-07T08:52:13.442		47.47	-64.16	51112.37	-20.22		
lambda	I	2033-01-07T08:53:07.499		47.27	-63.97	50026.71	-20.03		
delta	I	2033-01-07T08:54:34.130		46.96	-63.66	48300.35	-19.83		
gamma	I	2033-01-07T08:55:07.936		46.84	-63.55	47631.50	-19.74		
eta	I	2033-01-07T08:55:31.036		46.76	-63.46	47176.12	-19.68		
beta	I	2033-01-07T08:56:47.529		46.48	-63.20	45678.39	-19.48		
alpha	I	2033-01-07T08:57:35.849		46.31	-63.02	44740.96	-19.34		
4	I	2033-01-07T08:59:26.802		45.91	-62.63	42613.28	-18.96		
5	I	2033-01-07T08:59:46.285		45.84	-62.56	42249.59	-18.93		
6	I	2033-01-07T09:00:10.342		45.75	-62.48	41796.18	-18.81		
Uranus	I	2033-01-07T09:17:43.941		41.97	-58.74	25542.78		2.23	2.34
Uranus	E	2033-01-07T09:34:21.695		38.40	-55.18	25129.29		11.70	12.23
6	E	2033-01-07T09:51:49.766		34.67	-51.42	41843.19	18.74		
5	E	2033-01-07T09:52:13.747		34.58	-51.33	42301.16	18.86		
4	E	2033-01-07T09:52:26.761		34.54	-51.29	42538.45	18.89		
alpha	E	2033-01-07T09:54:21.485		34.13	-50.88	44730.44	19.26		
beta	E	2033-01-07T09:55:09.856		33.96	-50.70	45661.67	19.40		
eta	E	2033-01-07T09:56:27.499		33.68	-50.42	47176.12	19.60		
gamma	E	2033-01-07T09:56:50.331		33.60	-50.34	47624.25	19.66		
delta	E	2033-01-07T09:57:24.656		33.48	-50.22	48300.35	19.74		
lambda	E	2033-01-07T09:58:51.684		33.17	-49.91	50026.71	19.93		
epsilon	E	2033-01-07T10:00:04.999		32.91	-49.64	51493.57	20.12		

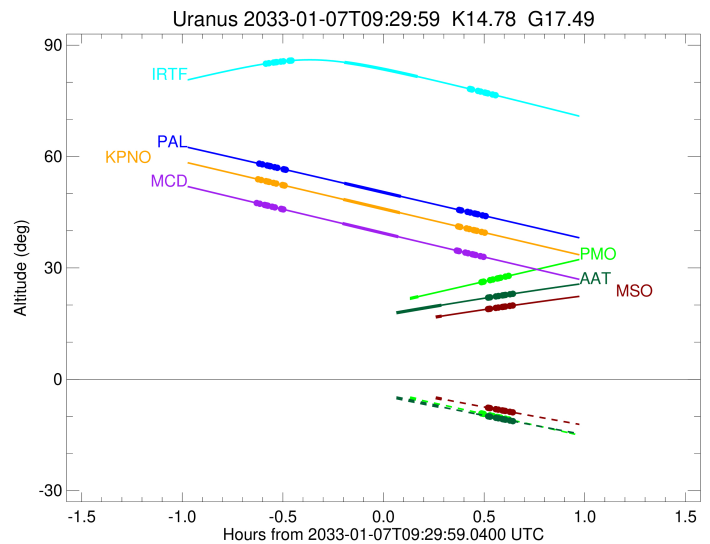
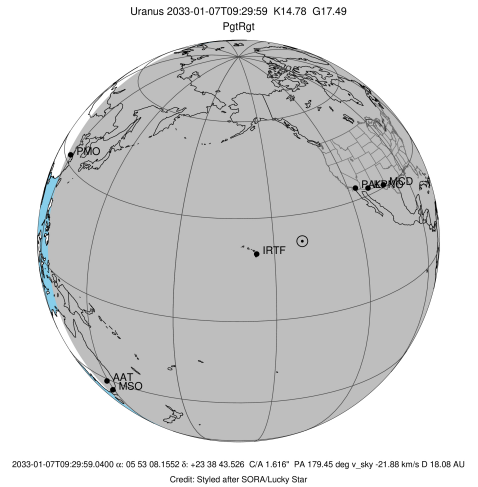
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2033-01-07T09:29:32.760
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        : 3427825772742319360
2Mass ID (if available) : 05530815+2338435
ICRS Star Coord at Epoch: 05h 53m 08.15523s +23:38:43.52570s
RUWE (>1.4 is poor)  : 1.03
K magnitude           : 14.779
G magnitude           : 17.495
RP magnitude          : 16.628
BP magnitude          : 18.231
DUPflag              : 0
Distance (au)         : 18.081
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -21.88
Sun-Target sep (deg)  : 161.49
Sun-Moon sep (deg)    : 82.26
B (ring opening deg)  : 76.64
PA of pole (deg)      : 52.65
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.576
C/A sky separation (km) : 20665.6
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_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



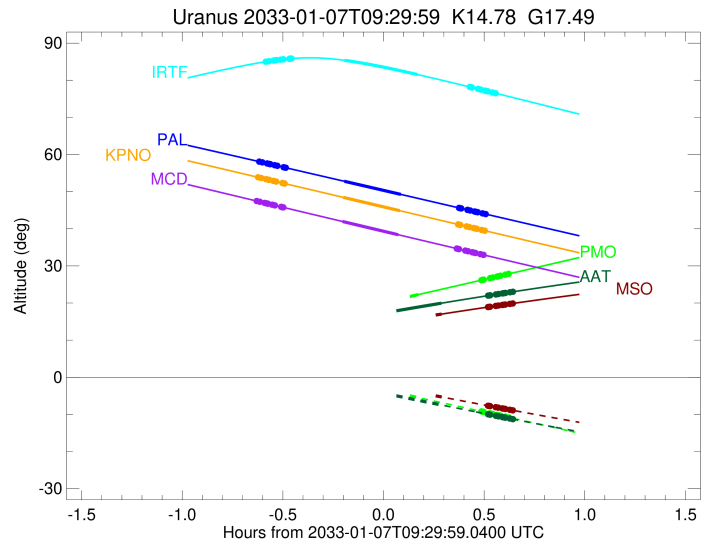
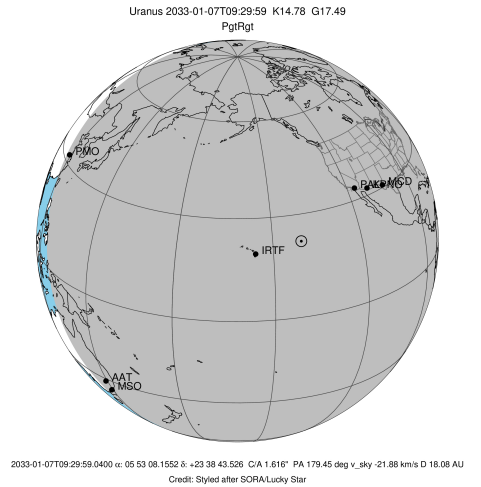
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-07T08:54:57.358		85.02	-68.10	51095.82	-20.82		
lambda	I	2033-01-07T08:55:49.008		85.14	-68.30	50026.71	-20.65		
delta	I	2033-01-07T08:57:12.914		85.32	-68.63	48300.35	-20.49		
gamma	I	2033-01-07T08:57:45.606		85.39	-68.75	47631.45	-20.43		
eta	I	2033-01-07T08:58:07.923		85.43	-68.84	47176.12	-20.38		
beta	I	2033-01-07T08:59:21.741		85.57	-69.12	45677.87	-20.22		
alpha	I	2033-01-07T09:00:08.302		85.65	-69.30	44739.66	-20.11		
4	I	2033-01-07T09:01:54.669		85.81	-69.71	42614.13	-19.80		
5	I	2033-01-07T09:02:13.617		85.83	-69.78	42245.29	-19.78		
6	I	2033-01-07T09:02:36.361		85.86	-69.87	41796.85	-19.69		
Uranus	I	2033-01-07T09:18:19.192		85.38	-73.49	25558.91		0.17	0.18
Uranus	E	2033-01-07T09:40:07.735		81.54	-78.48	25060.51		12.64	13.22
6	E	2033-01-07T09:55:43.958		78.21	-81.99	41845.93	19.67		
5	E	2033-01-07T09:56:06.543		78.13	-82.07	42298.09	19.77		
4	E	2033-01-07T09:56:19.054		78.08	-82.12	42536.52	19.79		
alpha	E	2033-01-07T09:58:08.789		77.68	-82.52	44728.51	20.09		
beta	E	2033-01-07T09:58:55.231		77.51	-82.69	45660.48	20.20		
eta	E	2033-01-07T10:00:09.931		77.23	-82.96	47176.12	20.36		
gamma	E	2033-01-07T10:00:31.899		77.15	-83.04	47623.98	20.41		
delta	E	2033-01-07T10:01:04.984		77.03	-83.16	48300.35	20.48		
lambda	E	2033-01-07T10:02:28.958		76.72	-83.46	50026.71	20.64		
epsilon	E	2033-01-07T10:03:39.273		76.46	-83.71	51482.03	20.80		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-07T09:33:13.070
 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 : 3427825772742319360
 2Mass ID (if available) : 05530815+2338435
 ICRS Star Coord at Epoch: 05h 53m 08.15523s +23:38:43.52570s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.779
 G magnitude : 17.495
 RP magnitude : 16.628
 BP magnitude : 18.231
 DUPflag : 0
 Distance (au) : 18.081
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.88
 Sun-Target sep (deg) : 161.49
 Sun-Moon sep (deg) : 81.47
 B (ring opening deg) : 76.64
 PA of pole (deg) : 52.65
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.272
 C/A sky separation (km) : 16674.2
 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	2033-01-07T08:57:13.063		11.91	1.96x	51064.34	-21.29		
lambda	I	2033-01-07T08:58:02.003		12.05	1.80x	50026.71	-21.18		
delta	I	2033-01-07T08:59:23.715		12.29	1.54x	48300.35	-21.08		
gamma	I	2033-01-07T08:59:55.486		12.37	1.43x	47631.34	-21.04		
eta	I	2033-01-07T09:00:17.140		12.44	1.36x	47176.12	-21.01		
beta	I	2033-01-07T09:01:28.683		12.64	1.13x	45676.79	-20.91		
alpha	I	2033-01-07T09:02:13.731		12.77	0.99x	44737.09	-20.84		
4	I	2033-01-07T09:03:55.819		13.05	0.66x	42615.37	-20.66		
5	I	2033-01-07T09:04:14.491		13.10	0.60x	42237.24	-20.65		
6	I	2033-01-07T09:04:35.772		13.16	0.53x	41798.40	-20.59		
Uranus	I	2033-01-07T09:18:39.574		15.49	-2.15x	25533.86		-2.78	-2.91
Uranus	E	2033-01-07T09:47:14.323		19.95	-7.46	25008.26		13.32	13.92
6	E	2033-01-07T10:01:10.896		21.99	-9.97	41850.61	20.65		
5	E	2033-01-07T10:01:31.948		22.04	-10.04	42292.11	20.71		
4	E	2033-01-07T10:01:44.084		22.07	-10.07	42533.49	20.72		
alpha	E	2033-01-07T10:03:29.153		22.32	-10.38	44725.04	20.91		
beta	E	2033-01-07T10:04:13.873		22.42	-10.51	45658.42	20.98		
eta	E	2033-01-07T10:05:26.013		22.59	-10.73	47176.12	21.08		
gamma	E	2033-01-07T10:05:47.219		22.64	-10.79	47623.52	21.11		
delta	E	2033-01-07T10:06:19.246		22.71	-10.88	48300.35	21.15		
lambda	E	2033-01-07T10:07:40.654		22.90	-11.12	50026.71	21.26		
epsilon	E	2033-01-07T10:08:47.943		23.06	-11.32	51459.58	21.37		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-07T09:33:04.640
 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 : 3427825772742319360
 2Mass ID (if available) : 05530815+2338435
 ICRS Star Coord at Epoch: 05h 53m 08.15523s +23:38:43.52570s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.779
 G magnitude : 17.495
 RP magnitude : 16.628
 BP magnitude : 18.231
 DUPflag : 0
 Distance (au) : 18.081
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.88
 Sun-Target sep (deg) : 161.49
 Sun-Moon sep (deg) : 81.43
 B (ring opening deg) : 76.64
 PA of pole (deg) : 52.65
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.250
 C/A sky separation (km) : 16397.2
 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	2033-01-07T08:56:59.671		9.38	3.74x	51061.95	-21.32		
lambda	I	2033-01-07T08:57:48.420		9.51	3.59x	50026.71	-21.21		
delta	I	2033-01-07T08:59:09.991		9.73	3.34x	48300.35	-21.12		
gamma	I	2033-01-07T08:59:41.704		9.82	3.24x	47631.33	-21.08		
eta	I	2033-01-07T09:00:03.316		9.87	3.18x	47176.12	-21.05		
beta	I	2033-01-07T09:01:14.718		10.06	2.96x	45676.70	-20.95		
alpha	I	2033-01-07T09:01:59.674		10.18	2.82x	44736.90	-20.89		
4	I	2033-01-07T09:03:41.503		10.46	2.50x	42615.45	-20.71		
5	I	2033-01-07T09:04:00.164		10.51	2.45x	42236.64	-20.70		
6	I	2033-01-07T09:04:21.351		10.56	2.38x	41798.54	-20.64		
Uranus	I	2033-01-07T09:18:20.224		12.75	-0.17x	25530.39		-2.96	-3.10
Uranus	E	2033-01-07T09:47:17.321		17.01	-5.30	25007.10		13.33	13.94
6	E	2033-01-07T10:01:09.184		18.91	-7.67	41850.90	20.70		
5	E	2033-01-07T10:01:30.153		18.96	-7.73	42291.72	20.76		
4	E	2033-01-07T10:01:42.272		18.98	-7.77	42533.32	20.77		
alpha	E	2033-01-07T10:03:27.100		19.22	-8.06	44724.82	20.96		
beta	E	2033-01-07T10:04:11.733		19.31	-8.18	45658.30	21.02		
eta	E	2033-01-07T10:05:23.745		19.47	-8.39	47176.12	21.12		
gamma	E	2033-01-07T10:05:44.913		19.52	-8.45	47623.49	21.15		
delta	E	2033-01-07T10:06:16.887		19.59	-8.53	48300.35	21.19		
lambda	E	2033-01-07T10:07:38.168		19.76	-8.76	50026.71	21.29		
epsilon	E	2033-01-07T10:08:45.294		19.91	-8.95	51458.12	21.40		