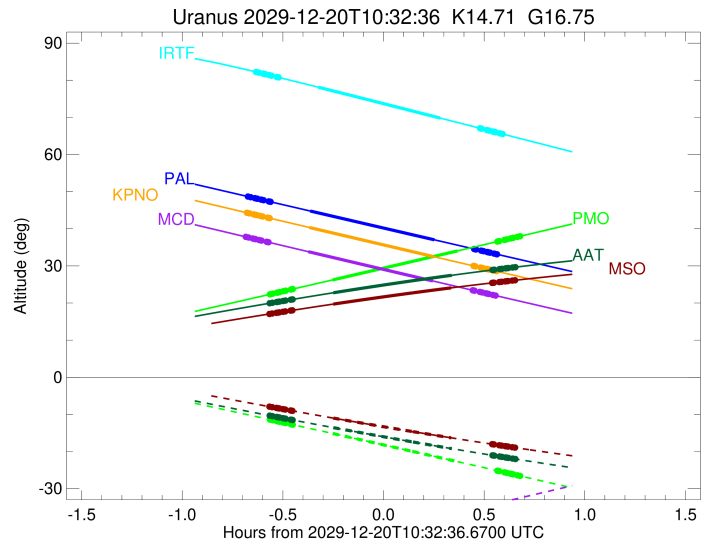
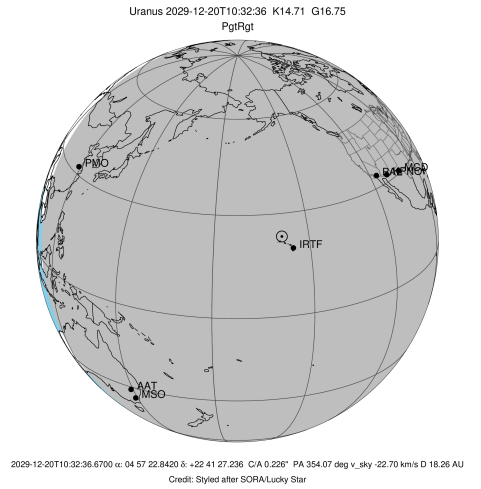


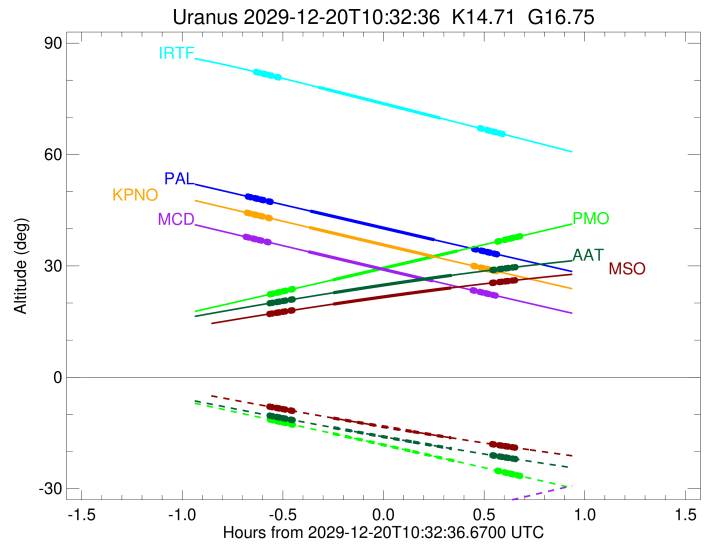
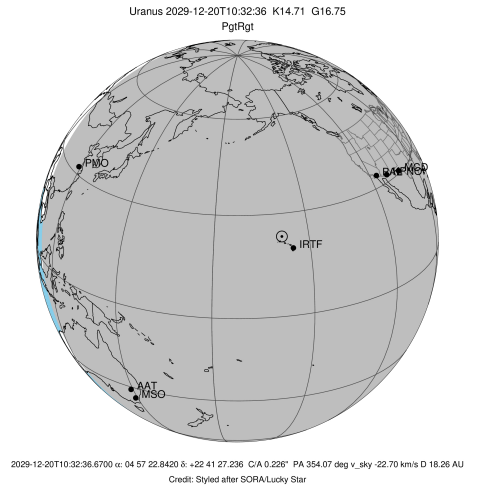

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2029-12-20T10:29:16.580
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        : 3412547715075096832
2Mass ID (if available) : 04572283+2241272
ICRS Star Coord at Epoch: 04h 57m 22.84202s +22:41:27.23645s
RUWE (>1.4 is poor)  : 0.97
K magnitude           : 14.708
G magnitude           : 16.746
RP magnitude          : 16.049
BP magnitude          : 17.295
DUPflag              : 0
Distance (au)         : 18.262
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -22.70
Sun-Target sep (deg)  : 167.18
Sun-Moon sep (deg)    : 6.50
B (ring opening deg)  : 81.98
PA of pole (deg)      : -20.97
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.112
C/A sky separation (km) : 1487.0
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_itrfr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-20T09:51:59.309		48.72	-60.56	51438.76	-22.98		
lambda	I	2029-12-20T09:53:00.739		48.51	-60.35	50026.71	-22.99		
delta	I	2029-12-20T09:54:15.850		48.25	-60.09	48300.35	-22.98		
gamma	I	2029-12-20T09:54:45.263		48.14	-59.99	47624.39	-22.98		
eta	I	2029-12-20T09:55:04.769		48.07	-59.93	47176.12	-22.98		
beta	I	2029-12-20T09:56:10.027		47.85	-59.70	45676.65	-22.98		
alpha	I	2029-12-20T09:56:53.169		47.70	-59.55	44685.50	-22.98		
4	I	2029-12-20T09:58:23.231		47.38	-59.25	42616.55	-22.97		
5	I	2029-12-20T09:58:36.517		47.33	-59.20	42311.21	-22.97		
6	I	2029-12-20T09:58:55.616		47.27	-59.13	41872.69	-22.97		
Uranus	I	2029-12-20T10:10:45.885		44.78	-56.69	25535.61		1.59	1.66
Uranus	E	2029-12-20T10:47:47.075		37.02	-48.97	25501.79		-2.49	-2.60
6	E	2029-12-20T10:59:37.176		34.55	-46.49	41800.24	22.88		
5	E	2029-12-20T10:59:52.802		34.50	-46.44	42157.31	22.88		
4	E	2029-12-20T11:00:08.904		34.44	-46.38	42526.14	22.88		
alpha	E	2029-12-20T11:01:46.137		34.11	-46.04	44750.98	22.88		
beta	E	2029-12-20T11:02:25.278		33.97	-45.91	45646.47	22.88		
eta	E	2029-12-20T11:03:32.130		33.74	-45.68	47176.12	22.88		
gamma	E	2029-12-20T11:03:51.897		33.67	-45.61	47628.45	22.88		
delta	E	2029-12-20T11:04:21.259		33.57	-45.50	48300.35	22.88		
lambda	E	2029-12-20T11:05:36.704		33.30	-45.24	50026.71	22.88		
epsilon	E	2029-12-20T11:06:12.314		33.18	-45.12	50841.54	22.88		

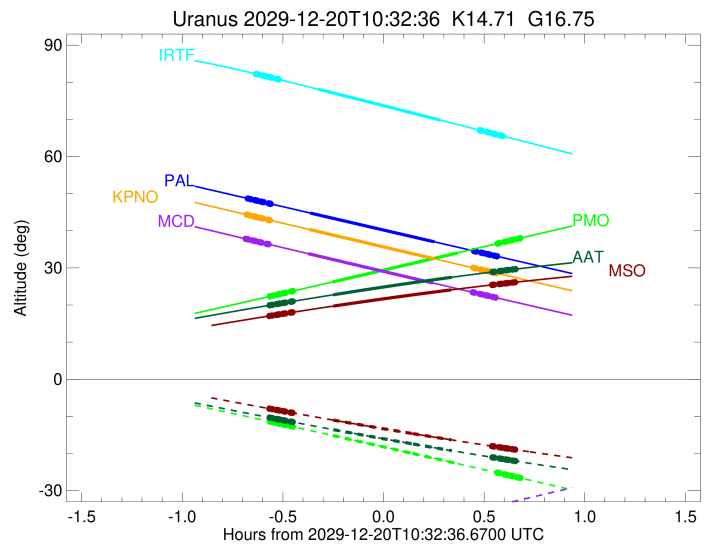
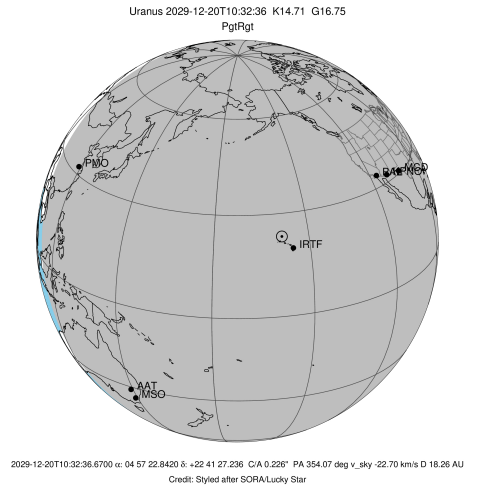
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-20T10:36:05.660
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3412547715075096832
 2Mass ID (if available) : 04572283+2241272
 ICRS Star Coord at Epoch: 04h 57m 22.84202s +22:41:27.23645s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.708
 G magnitude : 16.746
 RP magnitude : 16.049
 BP magnitude : 17.295
 DUPflag : 0
 Distance (au) : 18.262
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.70
 Sun-Target sep (deg) : 167.18
 Sun-Moon sep (deg) : 7.83
 B (ring opening deg) : 81.98
 PA of pole (deg) : -20.97
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.020
 C/A sky separation (km) : 269.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl1.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	2029-12-20T09:58:32.277		22.30	-11.36	51448.51	-22.79		
lambda	I	2029-12-20T09:59:34.663		22.52	-11.57	50026.71	-22.79		
delta	I	2029-12-20T10:00:50.408		22.78	-11.82	48300.35	-22.79		
gamma	I	2029-12-20T10:01:20.073		22.88	-11.92	47624.20	-22.79		
eta	I	2029-12-20T10:01:39.731		22.95	-11.98	47176.12	-22.79		
beta	I	2029-12-20T10:02:45.542		23.17	-12.20	45676.16	-22.79		
alpha	I	2029-12-20T10:03:28.995		23.32	-12.35	44685.81	-22.80		
4	I	2029-12-20T10:04:59.779		23.64	-12.65	42616.46	-22.80		
5	I	2029-12-20T10:05:13.117		23.68	-12.69	42312.15	-22.80		
6	I	2029-12-20T10:05:32.370		23.75	-12.76	41873.60	-22.80		
Uranus	I	2029-12-20T10:17:27.627		26.23	-15.15	25520.25		2.04	2.14
Uranus	E	2029-12-20T10:54:42.012		34.05	-22.73	25513.87		-2.21	-2.31
6	E	2029-12-20T11:06:31.890		36.55	-25.17	41800.63	22.89		
5	E	2029-12-20T11:06:47.507		36.60	-25.22	42157.67	22.89		
4	E	2029-12-20T11:07:03.588		36.66	-25.28	42526.07	22.89		
alpha	E	2029-12-20T11:08:40.789		37.00	-25.61	44751.13	22.90		
beta	E	2029-12-20T11:09:19.893		37.14	-25.75	45646.26	22.90		
eta	E	2029-12-20T11:10:26.713		37.38	-25.98	47176.12	22.90		
gamma	E	2029-12-20T11:10:46.463		37.45	-26.04	47628.38	22.90		
delta	E	2029-12-20T11:11:15.807		37.55	-26.15	48300.35	22.90		
lambda	E	2029-12-20T11:12:31.191		37.82	-26.41	50026.71	22.90		
epsilon	E	2029-12-20T11:13:06.916		37.94	-26.53	50844.91	22.90		

```

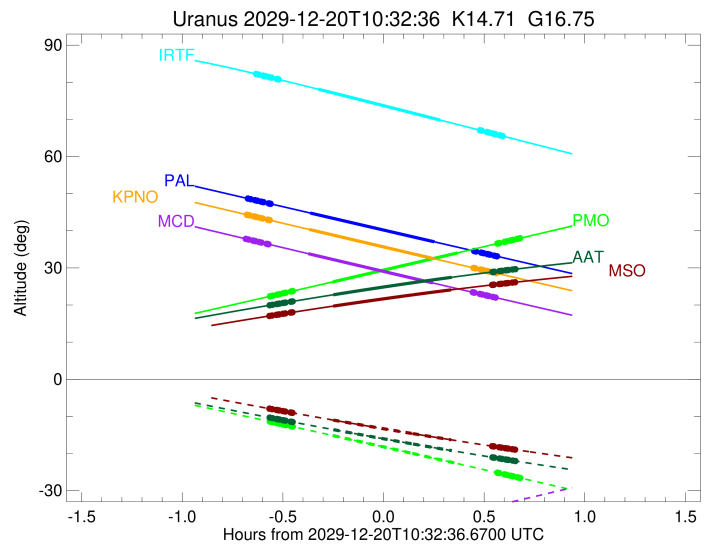
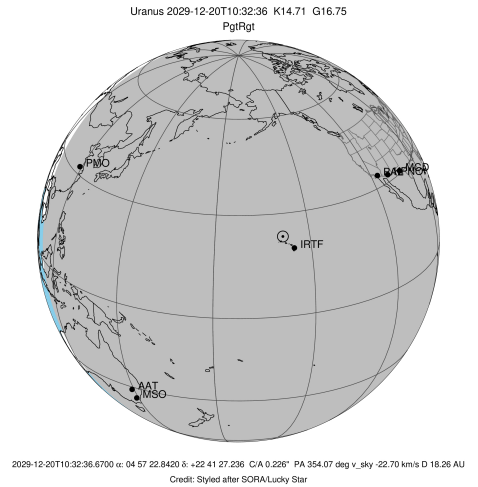
target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2029-12-20T10:29:01.950
Event type             : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code         : KPNO
Location               : Kitt Peak Natl Obs
Latitude (deg)        : 31.96333
E. Longitude (deg)    : 248.40000
Altitude (km)         : 2.120
Gaia source ID        : 3412547715075096832
2Mass ID (if available) : 04572283+2241272
ICRS Star Coord at Epoch: 04h 57m 22.84202s +22:41:27.23645s
RUWE (>1.4 is poor)  : 0.97
K magnitude           : 14.708
G magnitude           : 16.746
RP magnitude          : 16.049
BP magnitude          : 17.295
DUPflag               : 0
Distance (au)         : 18.262
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -22.70
Sun-Target sep (deg)  : 167.18
Sun-Moon sep (deg)    : 6.45
B (ring opening deg)  : 81.98
PA of pole (deg)      : -20.97
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.113
C/A sky separation (km) : 1498.4
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_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	2029-12-20T09:51:42.416		44.35	-56.42	51438.54	-22.96		
lambda	I	2029-12-20T09:52:43.893		44.13	-56.20	50026.71	-22.96		
delta	I	2029-12-20T09:53:59.075		43.87	-55.93	48300.35	-22.96		
gamma	I	2029-12-20T09:54:28.515		43.76	-55.83	47624.39	-22.96		
eta	I	2029-12-20T09:54:48.040		43.69	-55.76	47176.12	-22.96		
beta	I	2029-12-20T09:55:53.359		43.46	-55.53	45676.66	-22.96		
alpha	I	2029-12-20T09:56:36.544		43.31	-55.38	44685.49	-22.95		
4	I	2029-12-20T09:58:06.692		42.99	-55.06	42616.55	-22.95		
5	I	2029-12-20T09:58:19.992		42.94	-55.01	42311.19	-22.95		
6	I	2029-12-20T09:58:39.110		42.87	-54.95	41872.67	-22.95		
Uranus	I	2029-12-20T10:10:30.089		40.35	-52.43	25535.84		1.58	1.65
Uranus	E	2029-12-20T10:47:33.710		32.50	-44.56	25501.81		-2.48	-2.60
6	E	2029-12-20T10:59:24.698		30.01	-42.05	41800.25	22.86		
5	E	2029-12-20T10:59:40.344		29.95	-42.00	42157.31	22.85		
4	E	2029-12-20T10:59:56.466		29.90	-41.94	42526.14	22.86		
alpha	E	2029-12-20T11:01:33.823		29.56	-41.59	44750.98	22.85		
beta	E	2029-12-20T11:02:13.014		29.42	-41.46	45646.46	22.85		
eta	E	2029-12-20T11:03:19.952		29.18	-41.22	47176.12	22.85		
gamma	E	2029-12-20T11:03:39.744		29.11	-41.15	47628.45	22.85		
delta	E	2029-12-20T11:04:09.144		29.01	-41.05	48300.35	22.85		
lambda	E	2029-12-20T11:05:24.687		28.75	-40.78	50026.71	22.85		
epsilon	E	2029-12-20T11:06:00.346		28.62	-40.65	50841.61	22.85		

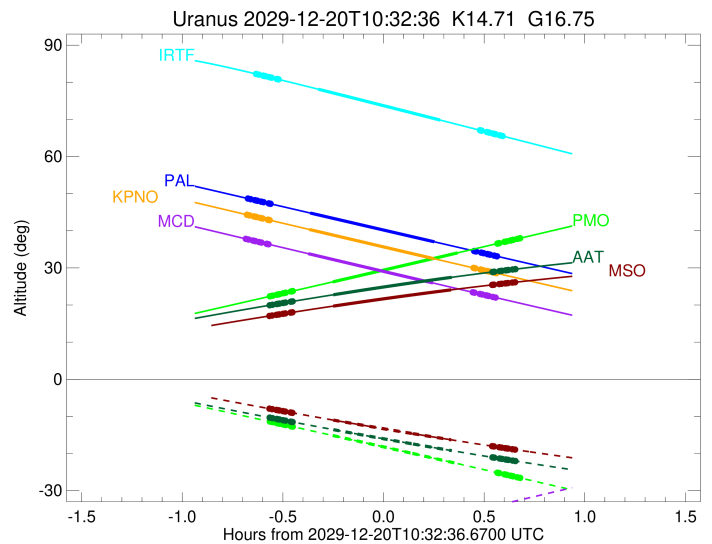
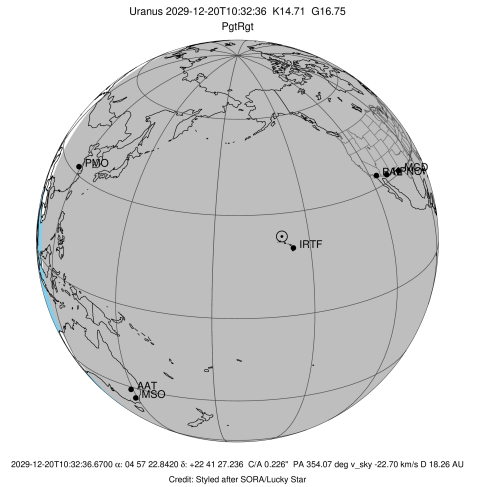
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2029-12-20T10:28:44.750
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      : 3412547715075096832
2Mass ID (if available) : 04572283+2241272
ICRS Star Coord at Epoch: 04h 57m 22.84202s +22:41:27.23645s
RUWE (>1.4 is poor) : 0.97
K magnitude         : 14.708
G magnitude         : 16.746
RP magnitude        : 16.049
BP magnitude        : 17.295
DUPflag            : 0
Distance (au)       : 18.262
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -22.70
Sun-Target sep (deg) : 167.18
Sun-Moon sep (deg)  : 6.38
B (ring opening deg) : 81.98
PA of pole (deg)    : -20.97
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.107
C/A sky separation (km) : 1414.9
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	2029-12-20T09:51:21.164		37.87	-50.06	51438.81	-22.93		
lambda	I	2029-12-20T09:52:22.751		37.65	-49.84	50026.71	-22.93		
delta	I	2029-12-20T09:53:38.053		37.38	-49.57	48300.35	-22.92		
gamma	I	2029-12-20T09:54:07.541		37.27	-49.46	47624.38	-22.92		
eta	I	2029-12-20T09:54:27.096		37.20	-49.39	47176.12	-22.92		
beta	I	2029-12-20T09:55:32.521		36.97	-49.16	45676.65	-22.92		
alpha	I	2029-12-20T09:56:15.774		36.81	-49.00	44685.50	-22.92		
4	I	2029-12-20T09:57:46.068		36.49	-48.68	42616.55	-22.91		
5	I	2029-12-20T09:57:59.388		36.44	-48.63	42311.22	-22.91		
6	I	2029-12-20T09:58:18.537		36.38	-48.56	41872.70	-22.91		
Uranus	I	2029-12-20T10:10:10.678		33.84	-46.01	25535.25		1.60	1.68
Uranus	E	2029-12-20T10:47:18.920		25.94	-38.04	25503.18		-2.46	-2.57
6	E	2029-12-20T10:59:11.226		23.44	-35.51	41800.31	22.81		
5	E	2029-12-20T10:59:26.903		23.39	-35.46	42157.36	22.81		
4	E	2029-12-20T10:59:43.054		23.33	-35.40	42526.13	22.81		
alpha	E	2029-12-20T11:01:20.606		22.99	-35.05	44751.01	22.81		
beta	E	2029-12-20T11:01:59.872		22.85	-34.91	45646.43	22.81		
eta	E	2029-12-20T11:03:06.945		22.62	-34.68	47176.12	22.81		
gamma	E	2029-12-20T11:03:26.777		22.55	-34.61	47628.44	22.81		
delta	E	2029-12-20T11:03:56.237		22.45	-34.50	48300.35	22.81		
lambda	E	2029-12-20T11:05:11.931		22.18	-34.23	50026.71	22.81		
epsilon	E	2029-12-20T11:05:47.689		22.06	-34.11	50842.21	22.80		

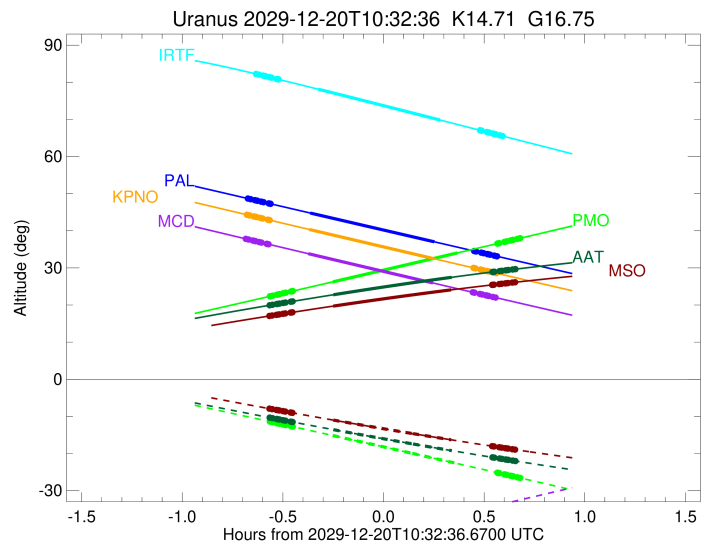
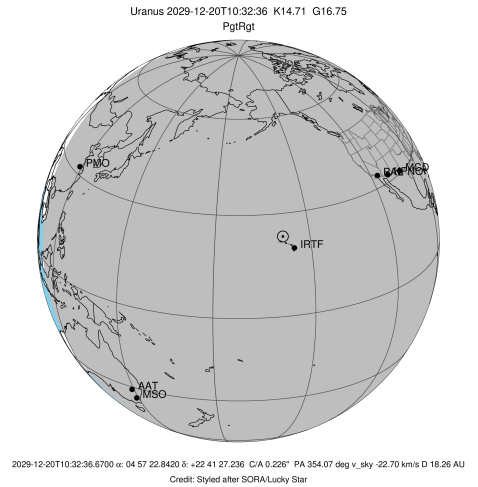
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-20T10:31:21.390
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : IRTF
 Location : Mauna Kea/IRTF
 Latitude (deg) : 19.82622
 E. Longitude (deg) : 204.52800
 Altitude (km) : 4.168
 Gaia source ID : 3412547715075096832
 2Mass ID (if available) : 04572283+2241272
 ICRS Star Coord at Epoch: 04h 57m 22.8420s +22:41:27.23645s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.708
 G magnitude : 16.746
 RP magnitude : 16.049
 BP magnitude : 17.295
 DUPflag : 0
 Distance (au) : 18.262
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.70
 Sun-Target sep (deg) : 167.18
 Sun-Moon sep (deg) : 6.95
 B (ring opening deg) : 81.98
 PA of pole (deg) : -20.97
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.263
 C/A sky separation (km) : 3482.5
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-20T09:54:24.800		82.29	-83.07	51428.57	-23.09		
lambda	I	2029-12-20T09:55:25.503		82.07	-83.27	50026.71	-23.09		
delta	I	2029-12-20T09:56:40.272		81.80	-83.51	48300.35	-23.09		
gamma	I	2029-12-20T09:57:09.545		81.70	-83.60	47624.58	-23.08		
eta	I	2029-12-20T09:57:28.972		81.62	-83.66	47176.12	-23.08		
beta	I	2029-12-20T09:58:33.921		81.39	-83.86	45677.15	-23.08		
alpha	I	2029-12-20T09:59:16.910		81.23	-83.99	44685.21	-23.07		
4	I	2029-12-20T10:00:46.582		80.90	-84.26	42616.56	-23.07		
5	I	2029-12-20T10:00:59.870		80.85	-84.30	42310.04	-23.06		
6	I	2029-12-20T10:01:18.882		80.78	-84.36	41871.62	-23.06		
Uranus	I	2029-12-20T10:13:07.073		78.15	-85.98	25549.69		1.00	1.05
Uranus	E	2029-12-20T10:49:32.708		69.81	-82.10	25469.85		-3.11	-3.25
6	E	2029-12-20T11:01:20.559		67.09	-79.60	41799.21	23.03		
5	E	2029-12-20T11:01:36.104		67.03	-79.55	42156.39	23.03		
4	E	2029-12-20T11:01:52.147		66.97	-79.49	42526.42	23.03		
alpha	E	2029-12-20T11:03:28.711		66.60	-79.14	44750.46	23.04		
beta	E	2029-12-20T11:04:07.641		66.45	-79.00	45647.15	23.04		
eta	E	2029-12-20T11:05:14.001		66.19	-78.76	47176.12	23.05		
gamma	E	2029-12-20T11:05:33.639		66.12	-78.68	47628.67	23.05		
delta	E	2029-12-20T11:06:02.783		66.00	-78.58	48300.35	23.05		
lambda	E	2029-12-20T11:07:17.681		65.72	-78.30	50026.71	23.05		
epsilon	E	2029-12-20T11:07:52.544		65.58	-78.18	50830.38	23.04		

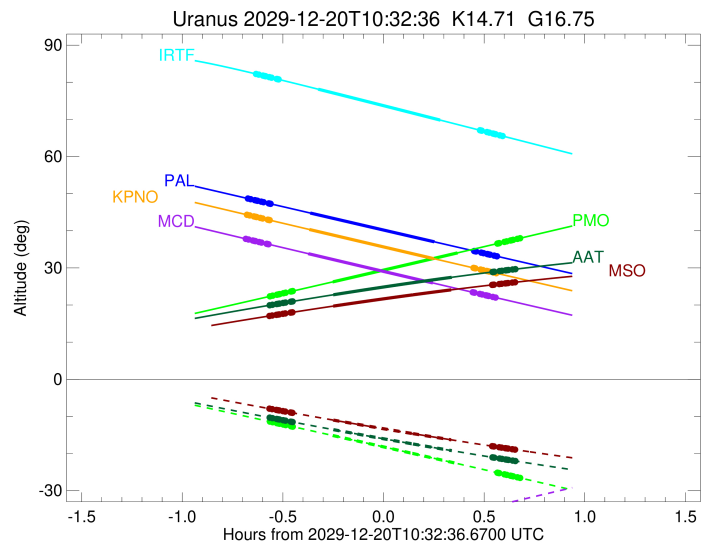
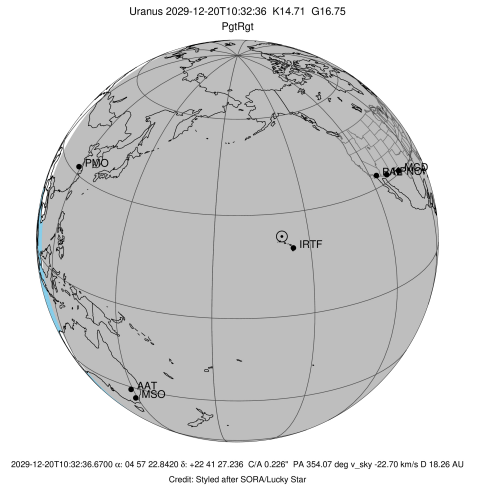
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2029-12-20T10:35:21.610
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        : 3412547715075096832
2Mass ID (if available) : 04572283+2241272
ICRS Star Coord at Epoch: 04h 57m 22.84202s +22:41:27.23645s
RUWE (>1.4 is poor)  : 0.97
K magnitude           : 14.708
G magnitude           : 16.746
RP magnitude          : 16.049
BP magnitude          : 17.295
DUPflag              : 0
Distance (au)         : 18.262
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -22.70
Sun-Target sep (deg)  : 167.18
Sun-Moon sep (deg)    : 7.73
B (ring opening deg) : 81.98
PA of pole (deg)     : -20.97
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.560
C/A sky separation (km) : 7420.8
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	2029-12-20T09:58:29.659		19.91	-10.30	51406.40	-22.71		
lambda	I	2029-12-20T09:59:30.374		20.07	-10.47	50026.71	-22.72		
delta	I	2029-12-20T10:00:46.396		20.26	-10.69	48300.35	-22.70		
gamma	I	2029-12-20T10:01:16.154		20.34	-10.78	47624.98	-22.69		
eta	I	2029-12-20T10:01:35.937		20.39	-10.84	47176.12	-22.69		
beta	I	2029-12-20T10:02:41.997		20.55	-11.03	45678.10	-22.67		
alpha	I	2029-12-20T10:03:25.832		20.67	-11.15	44684.80	-22.65		
4	I	2029-12-20T10:04:57.202		20.89	-11.41	42616.32	-22.62		
5	I	2029-12-20T10:05:10.870		20.93	-11.45	42307.19	-22.61		
6	I	2029-12-20T10:05:30.235		20.98	-11.51	41869.22	-22.61		
Uranus	I	2029-12-20T10:17:38.141		22.76	-13.57	25558.57		-0.21	-0.22
Uranus	E	2029-12-20T10:52:56.632		27.47	-19.22	25390.77		-4.28	-4.48
6	E	2029-12-20T11:05:04.142		28.90	-21.03	41797.48	22.67		
5	E	2029-12-20T11:05:19.989		28.93	-21.07	42155.20	22.67		
4	E	2029-12-20T11:05:36.350		28.96	-21.11	42527.31	22.68		
alpha	E	2029-12-20T11:07:14.248		29.14	-21.35	44749.23	22.72		
beta	E	2029-12-20T11:07:53.836		29.22	-21.44	45648.55	22.73		
eta	E	2029-12-20T11:09:01.010		29.34	-21.60	47176.12	22.75		
gamma	E	2029-12-20T11:09:20.914		29.38	-21.65	47629.08	22.76		
delta	E	2029-12-20T11:09:50.402		29.43	-21.72	48300.35	22.77		
lambda	E	2029-12-20T11:11:06.188		29.57	-21.90	50026.71	22.79		
epsilon	E	2029-12-20T11:11:40.571		29.63	-21.99	50810.41	22.78		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-20T10:35:16.480
 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 : 3412547715075096832
 2Mass ID (if available) : 04572283+2241272
 ICRS Star Coord at Epoch: 04h 57m 22.84202s +22:41:27.23645s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.708
 G magnitude : 16.746
 RP magnitude : 16.049
 BP magnitude : 17.295
 DUPflag : 0
 Distance (au) : 18.262
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.70
 Sun-Target sep (deg) : 167.18
 Sun-Moon sep (deg) : 7.71
 B (ring opening deg) : 81.98
 PA of pole (deg) : -20.97
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.582
 C/A sky separation (km) : 7702.3
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl1.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	2029-12-20T09:58:25.128		17.03	-7.89	51404.55	-22.68		
lambda	I	2029-12-20T09:59:25.846		17.17	-8.05	50026.71	-22.69		
delta	I	2029-12-20T10:00:41.979		17.36	-8.26	48300.35	-22.67		
gamma	I	2029-12-20T10:01:11.780		17.43	-8.34	47625.01	-22.66		
eta	I	2029-12-20T10:01:31.595		17.47	-8.40	47176.12	-22.65		
beta	I	2029-12-20T10:02:37.756		17.63	-8.58	45678.17	-22.63		
alpha	I	2029-12-20T10:03:21.666		17.73	-8.70	44684.77	-22.62		
4	I	2029-12-20T10:04:53.193		17.95	-8.95	42616.29	-22.58		
5	I	2029-12-20T10:05:06.896		17.98	-8.98	42306.94	-22.57		
6	I	2029-12-20T10:05:26.293		18.03	-9.04	41869.02	-22.57		
Uranus	I	2029-12-20T10:17:36.185		19.71	-10.99	25558.12		-0.31	-0.32
Uranus	E	2029-12-20T10:52:48.066		24.09	-16.31	25384.71		-4.36	-4.56
6	E	2029-12-20T11:04:57.792		25.42	-18.02	41797.38	22.62		
5	E	2029-12-20T11:05:13.674		25.45	-18.06	42155.15	22.63		
4	E	2029-12-20T11:05:30.070		25.48	-18.09	42527.38	22.64		
alpha	E	2029-12-20T11:07:08.142		25.65	-18.32	44749.14	22.68		
beta	E	2029-12-20T11:07:47.809		25.72	-18.41	45648.65	22.69		
eta	E	2029-12-20T11:08:55.094		25.83	-18.56	47176.12	22.72		
gamma	E	2029-12-20T11:09:15.033		25.87	-18.60	47629.11	22.72		
delta	E	2029-12-20T11:09:44.567		25.92	-18.67	48300.35	22.73		
lambda	E	2029-12-20T11:11:00.475		26.04	-18.84	50026.71	22.75		
epsilon	E	2029-12-20T11:11:34.858		26.10	-18.92	50809.21	22.75		