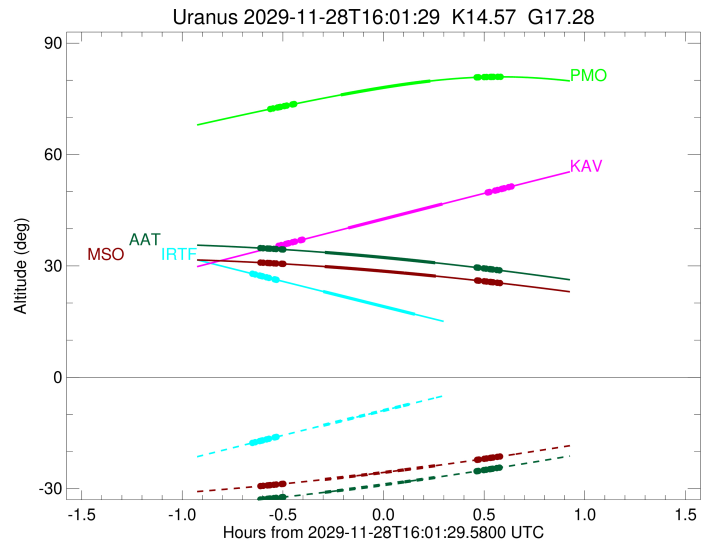
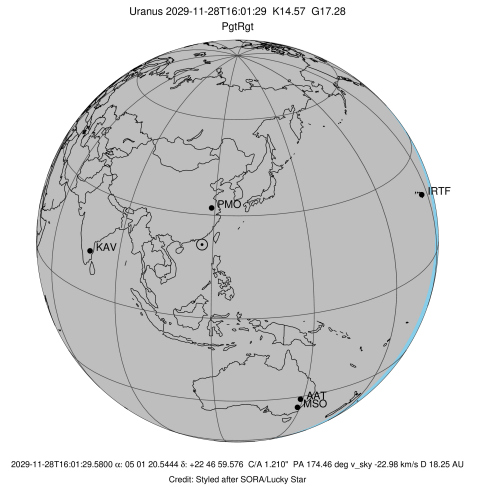


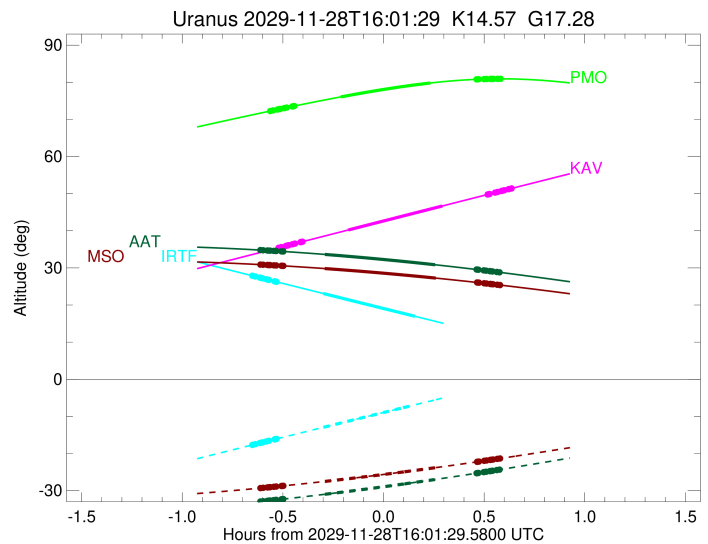
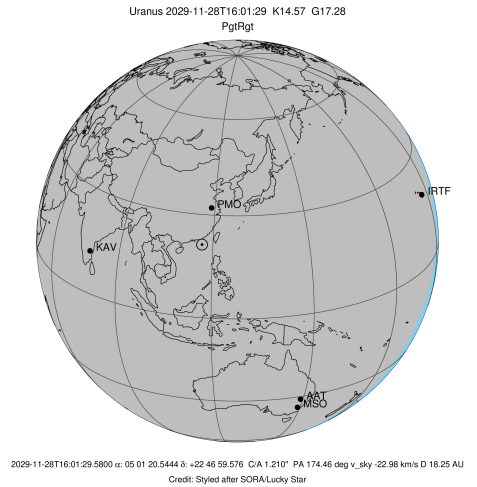
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-11-28T16:02:02.390
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3418515997332663936
 2Mass ID (if available) : 05012052+2246594
 ICRS Star Coord at Epoch: 05h 01m 20.54440s +22:46:59.57645s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.569
 G magnitude : 17.285
 RP magnitude : 16.411
 BP magnitude : 18.078
 DUPflag : 0
 Distance (au) : 18.255
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.98
 Sun-Target sep (deg) : 169.79
 Sun-Moon sep (deg) : 76.73
 B (ring opening deg) : 82.17
 PA of pole (deg) : -14.13
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.288
 C/A sky separation (km) : 17047.2
 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	2029-11-28T15:27:25.627		72.20	-78.10	51552.17	-22.01		
lambda	I	2029-11-28T15:28:35.053		72.42	-78.22	50026.71	-21.93		
delta	I	2029-11-28T15:29:53.967		72.67	-78.35	48300.35	-21.82		
gamma	I	2029-11-28T15:30:25.130		72.77	-78.40	47621.01	-21.78		
eta	I	2029-11-28T15:30:45.574		72.83	-78.43	47176.12	-21.75		
beta	I	2029-11-28T15:31:55.719		73.05	-78.54	45654.90	-21.63		
alpha	I	2029-11-28T15:32:39.204		73.19	-78.61	44715.92	-21.56		
4	I	2029-11-28T15:34:18.923		73.50	-78.75	42575.61	-21.35		
5	I	2029-11-28T15:34:33.474		73.54	-78.77	42267.03	-21.32		
6	I	2029-11-28T15:34:52.319		73.60	-78.79	41862.55	-21.28		
Uranus	I	2029-11-28T15:48:48.023		76.07	-79.49	25204.15		6.11	6.39
Uranus	E	2029-11-28T16:15:26.753		79.81	-78.38	25379.85		4.31	4.52
6	E	2029-11-28T16:29:12.582		80.79	-76.76	41794.89	21.30		
5	E	2029-11-28T16:29:29.787		80.80	-76.72	42158.79	21.34		
4	E	2029-11-28T16:29:47.296		80.81	-76.68	42534.83	21.37		
alpha	E	2029-11-28T16:31:30.176		80.87	-76.44	44744.39	21.58		
beta	E	2029-11-28T16:32:12.181		80.88	-76.34	45652.23	21.65		
eta	E	2029-11-28T16:33:22.367		80.91	-76.18	47176.12	21.77		
gamma	E	2029-11-28T16:33:43.187		80.91	-76.13	47629.67	21.80		
delta	E	2029-11-28T16:34:13.921		80.92	-76.05	48300.35	21.85		
lambda	E	2029-11-28T16:35:32.749		80.93	-75.86	50026.71	21.95		
epsilon	E	2029-11-28T16:36:08.193		80.93	-75.77	50805.64	22.03		

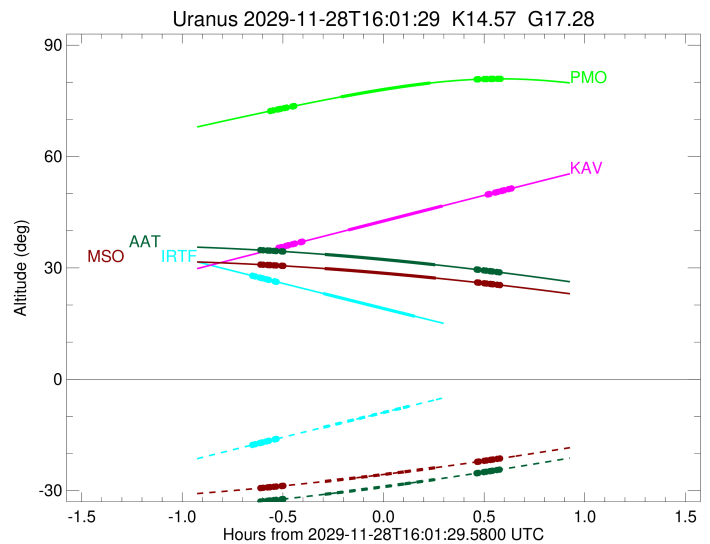
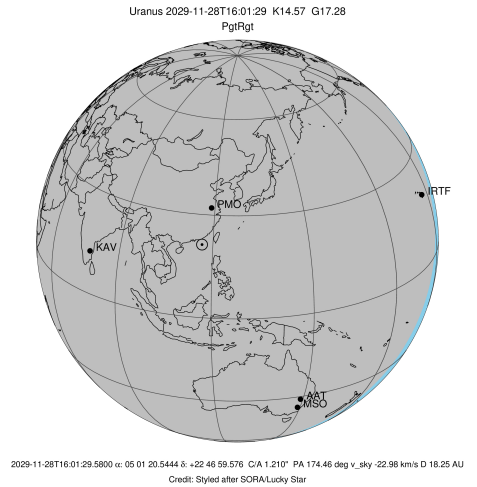
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2029-11-28T15:57:06.640
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      : 3418515997332663936
2Mass ID (if available) : 05012052+2246594
ICRS Star Coord at Epoch: 05h 01m 20.54440s +22:46:59.57645s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 14.569
G magnitude          : 17.285
RP magnitude         : 16.411
BP magnitude         : 18.078
DUPflag             : 0
Distance (au)       : 18.255
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -22.98
Sun-Target sep (deg) : 169.79
Sun-Moon sep (deg)  : 75.88
B (ring opening deg) : 82.17
PA of pole (deg)    : -14.13
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.270
C/A sky separation (km) : 16810.4
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



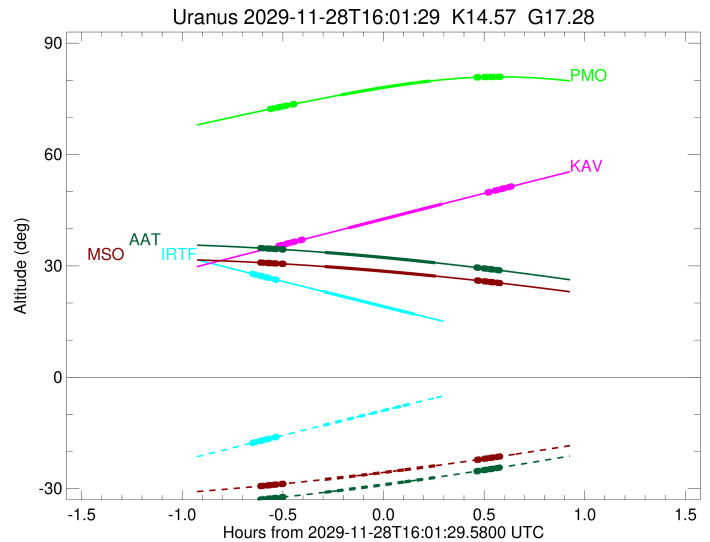
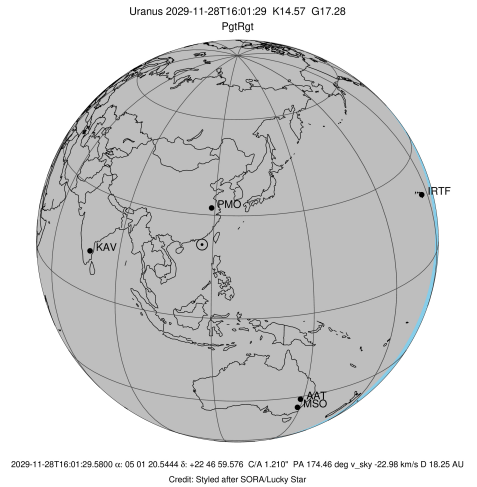
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-11-28T15:22:05.643		27.95	-17.76	51552.85	-21.87		
lambda	I	2029-11-28T15:23:15.543		27.69	-17.49	50026.71	-21.79		
delta	I	2029-11-28T15:24:34.959		27.39	-17.20	48300.35	-21.68		
gamma	I	2029-11-28T15:25:06.320		27.27	-17.08	47621.02	-21.64		
eta	I	2029-11-28T15:25:26.894		27.19	-17.00	47176.12	-21.61		
beta	I	2029-11-28T15:26:37.467		26.93	-16.74	45655.18	-21.49		
alpha	I	2029-11-28T15:27:21.261		26.76	-16.57	44715.42	-21.43		
4	I	2029-11-28T15:29:01.540		26.38	-16.20	42576.30	-21.22		
5	I	2029-11-28T15:29:16.159		26.33	-16.14	42268.16	-21.19		
6	I	2029-11-28T15:29:35.146		26.26	-16.07	41863.08	-21.15		
Uranus	I	2029-11-28T15:43:33.636		23.10	-12.94	25216.68		5.99	6.28
Uranus	E	2029-11-28T16:10:50.064		16.97	-6.89	25381.71		4.29	4.49
6	E	2029-11-28T16:24:42.189		13.88	-3.84x	41794.88	21.06		
5	E	2029-11-28T16:24:59.587		13.82	-3.78x	42158.72	21.10		
4	E	2029-11-28T16:25:17.293		13.75	-3.71x	42534.76	21.13		
alpha	E	2029-11-28T16:27:01.375		13.37	-3.33x	44744.46	21.33		
beta	E	2029-11-28T16:27:43.875		13.21	-3.18x	45652.17	21.39		
eta	E	2029-11-28T16:28:54.917		12.95	-2.92x	47176.12	21.50		
gamma	E	2029-11-28T16:29:15.993		12.87	-2.84x	47629.65	21.53		
delta	E	2029-11-28T16:29:47.108		12.75	-2.73x	48300.35	21.58		
lambda	E	2029-11-28T16:31:06.930		12.46	-2.44x	50026.71	21.68		
epsilon	E	2029-11-28T16:31:42.868		12.33	-2.31x	50806.50	21.75		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-11-28T16:04:55.830
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 3418515997332663936
 2Mass ID (if available) : 05012052+2246594
 ICRS Star Coord at Epoch: 05h 01m 20.54440s +22:46:59.57645s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.569
 G magnitude : 17.285
 RP magnitude : 16.411
 BP magnitude : 18.078
 DUPflag : 0
 Distance (au) : 18.255
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.98
 Sun-Target sep (deg) : 169.79
 Sun-Moon sep (deg) : 76.59
 B (ring opening deg) : 82.17
 PA of pole (deg) : -14.13
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.211
 C/A sky separation (km) : 16033.4
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.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



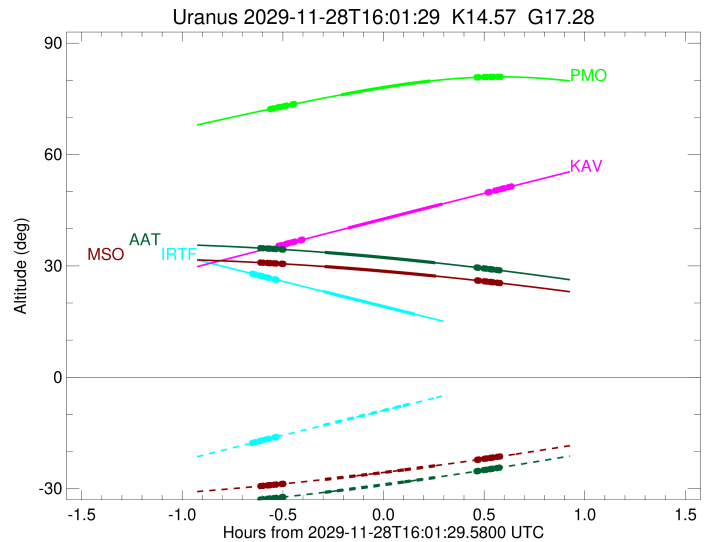
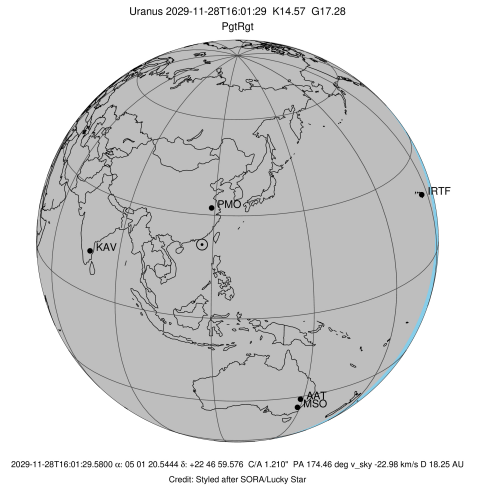
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-11-28T15:29:53.465		35.34	-45.53	51552.97	-22.04		
lambda	I	2029-11-28T15:31:02.818		35.61	-45.80	50026.71	-21.97		
delta	I	2029-11-28T15:32:21.559		35.91	-46.10	48300.35	-21.88		
gamma	I	2029-11-28T15:32:52.637		36.03	-46.22	47621.02	-21.84		
eta	I	2029-11-28T15:33:13.022		36.11	-46.30	47176.12	-21.81		
beta	I	2029-11-28T15:34:22.908		36.38	-46.57	45655.28	-21.71		
alpha	I	2029-11-28T15:35:06.267		36.55	-46.74	44715.23	-21.66		
4	I	2029-11-28T15:36:45.417		36.93	-47.12	42576.60	-21.47		
5	I	2029-11-28T15:36:59.855		36.98	-47.18	42268.67	-21.44		
6	I	2029-11-28T15:37:18.628		37.06	-47.25	41863.32	-21.41		
Uranus	I	2029-11-28T15:50:58.396		40.21	-50.41	25232.32		5.85	6.13
Uranus	E	2029-11-28T16:19:02.329		46.68	-56.88	25410.16		3.93	4.11
6	E	2029-11-28T16:32:30.648		49.77	-59.95	41795.01	21.49		
5	E	2029-11-28T16:32:47.716		49.83	-60.01	42159.59	21.52		
4	E	2029-11-28T16:33:05.088		49.90	-60.08	42535.67	21.56		
alpha	E	2029-11-28T16:34:47.082		50.29	-60.47	44743.74	21.74		
beta	E	2029-11-28T16:35:28.839		50.45	-60.62	45652.75	21.80		
eta	E	2029-11-28T16:36:38.537		50.71	-60.89	47176.12	21.91		
gamma	E	2029-11-28T16:36:59.233		50.79	-60.97	47629.78	21.93		
delta	E	2029-11-28T16:37:29.775		50.91	-61.08	48300.35	21.98		
lambda	E	2029-11-28T16:38:48.160		51.21	-61.38	50026.71	22.07		
epsilon	E	2029-11-28T16:39:23.175		51.34	-61.51	50800.24	22.14		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-11-28T16:00:23.980
 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 : 3418515997332663936
 2Mass ID (if available) : 05012052+2246594
 ICRS Star Coord at Epoch: 05h 01m 20.54440s +22:46:59.57645s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.569
 G magnitude : 17.285
 RP magnitude : 16.411
 BP magnitude : 18.078
 DUPflag : 0
 Distance (au) : 18.255
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.98
 Sun-Target sep (deg) : 169.79
 Sun-Moon sep (deg) : 76.22
 B (ring opening deg) : 82.17
 PA of pole (deg) : -14.13
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.814
 C/A sky separation (km) : 10776.6
 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	2029-11-28T15:24:29.675		34.81	-32.96	51555.28	-22.85		
lambda	I	2029-11-28T15:25:36.632		34.75	-32.86	50026.71	-22.81		
delta	I	2029-11-28T15:26:52.379		34.69	-32.74	48300.35	-22.77		
gamma	I	2029-11-28T15:27:22.219		34.66	-32.69	47621.16	-22.75		
eta	I	2029-11-28T15:27:41.784		34.64	-32.66	47176.12	-22.74		
beta	I	2029-11-28T15:28:48.622		34.58	-32.55	45657.80	-22.69		
alpha	I	2029-11-28T15:29:30.373		34.54	-32.48	44710.82	-22.67		
4	I	2029-11-28T15:31:04.398		34.45	-32.33	42582.78	-22.59		
5	I	2029-11-28T15:31:17.956		34.44	-32.31	42278.52	-22.57		
6	I	2029-11-28T15:31:36.030		34.42	-32.28	41867.80	-22.56		
Uranus	I	2029-11-28T15:44:00.567		33.63	-30.98	25378.02		4.33	4.54
Uranus	E	2029-11-28T16:16:54.045		30.85	-26.99	25511.31		2.21	2.32
6	E	2029-11-28T16:29:12.314		29.57	-25.32	41795.95	22.53		
5	E	2029-11-28T16:29:28.676		29.54	-25.28	42163.58	22.54		
4	E	2029-11-28T16:29:45.303		29.51	-25.24	42539.41	22.56		
alpha	E	2029-11-28T16:31:22.721		29.33	-25.01	44740.93	22.64		
beta	E	2029-11-28T16:32:03.072		29.26	-24.92	45654.87	22.66		
eta	E	2029-11-28T16:33:10.125		29.14	-24.76	47176.12	22.71		
gamma	E	2029-11-28T16:33:30.116		29.10	-24.71	47630.19	22.72		
delta	E	2029-11-28T16:33:59.601		29.04	-24.64	48300.35	22.74		
lambda	E	2029-11-28T16:35:15.459		28.90	-24.46	50026.71	22.78		
epsilon	E	2029-11-28T16:35:48.578		28.84	-24.38	50781.37	22.81		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-11-28T16:00:29.050
 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 : 3418515997332663936
 2Mass ID (if available) : 05012052+2246594
 ICRS Star Coord at Epoch: 05h 01m 20.54440s +22:46:59.57645s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.569
 G magnitude : 17.285
 RP magnitude : 16.411
 BP magnitude : 18.078
 DUPflag : 0
 Distance (au) : 18.255
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.98
 Sun-Target sep (deg) : 169.79
 Sun-Moon sep (deg) : 76.17
 B (ring opening deg) : 82.17
 PA of pole (deg) : -14.13
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.795
 C/A sky separation (km) : 10529.8
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-11-28T15:24:30.839		30.90	-29.34	51555.26	-22.85		
lambda	I	2029-11-28T15:25:37.773		30.85	-29.24	50026.71	-22.82		
delta	I	2029-11-28T15:26:53.489		30.79	-29.13	48300.35	-22.78		
gamma	I	2029-11-28T15:27:23.314		30.76	-29.09	47621.17	-22.76		
eta	I	2029-11-28T15:27:42.871		30.75	-29.06	47176.12	-22.75		
beta	I	2029-11-28T15:28:49.666		30.69	-28.96	45657.91	-22.71		
alpha	I	2029-11-28T15:29:31.404		30.66	-28.90	44710.63	-22.69		
4	I	2029-11-28T15:31:05.339		30.57	-28.76	42583.05	-22.60		
5	I	2029-11-28T15:31:18.879		30.56	-28.74	42278.92	-22.59		
6	I	2029-11-28T15:31:36.948		30.55	-28.71	41867.98	-22.58		
Uranus	I	2029-11-28T15:43:59.755		29.82	-27.52	25383.79		4.26	4.47
Uranus	E	2029-11-28T16:17:04.850		27.25	-23.80	25514.72		2.13	2.23
6	E	2029-11-28T16:29:21.434		26.08	-22.25	41796.01	22.55		
5	E	2029-11-28T16:29:37.784		26.05	-22.21	42163.80	22.56		
4	E	2029-11-28T16:29:54.398		26.02	-22.18	42539.61	22.58		
alpha	E	2029-11-28T16:31:31.721		25.86	-21.96	44740.78	22.66		
beta	E	2029-11-28T16:32:12.055		25.79	-21.88	45654.98	22.68		
eta	E	2029-11-28T16:33:19.061		25.68	-21.73	47176.12	22.72		
gamma	E	2029-11-28T16:33:39.041		25.64	-21.68	47630.21	22.73		
delta	E	2029-11-28T16:34:08.510		25.59	-21.62	48300.35	22.75		
lambda	E	2029-11-28T16:35:24.331		25.46	-21.45	50026.71	22.79		
epsilon	E	2029-11-28T16:35:57.398		25.40	-21.38	50780.51	22.82		