

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-12-14T12:51:05.620  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 869276916576698368  
 2Mass ID (if available) : 07182917+2239226

ICRS Star Coord at Epoch: 07h 18m 29.16835s +22:39:22.38018s

RUWE (>1.4 is poor) : 0.97  
 K magnitude : 13.433  
 G magnitude : 15.688  
 RP magnitude : 14.989  
 BP magnitude : 16.241  
 DUPflag : 0  
 Distance (au) : 17.875  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.43  
 Sun-Target sep (deg) : 154.55  
 Sun-Moon sep (deg) : 117.05  
 B (ring opening deg) : 58.60  
 PA of pole (deg) : 81.99

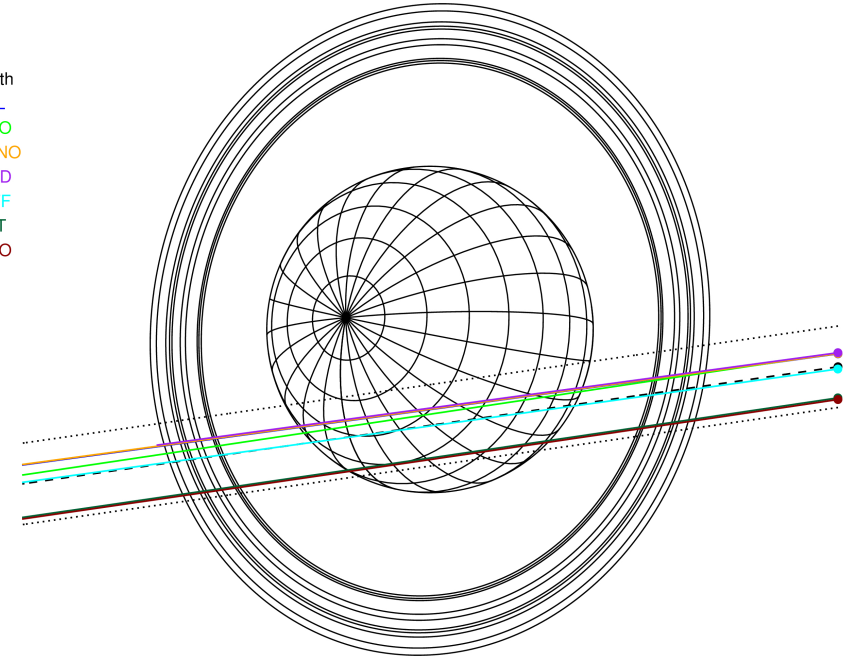
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2036-12-14T12:51:05.6200 a: 07 18 29.1684 & +22 39 22.380 C/A 1.137" PA 8.17 deg v\_sky -20.43 km/s D 17.87 AU  
 Credit: Styled after SORA/Lucky Star

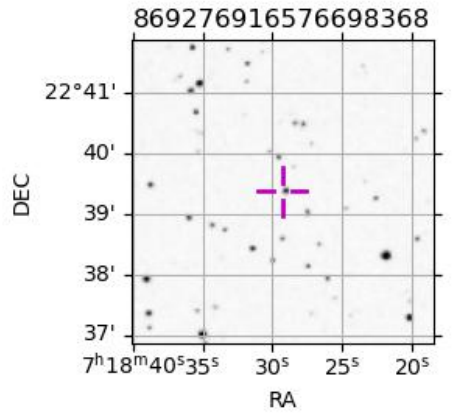
Uranus 2036-12-14T12:51:05 K13.43 G15.69 PgtRgt

Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 AAT  
 MSO



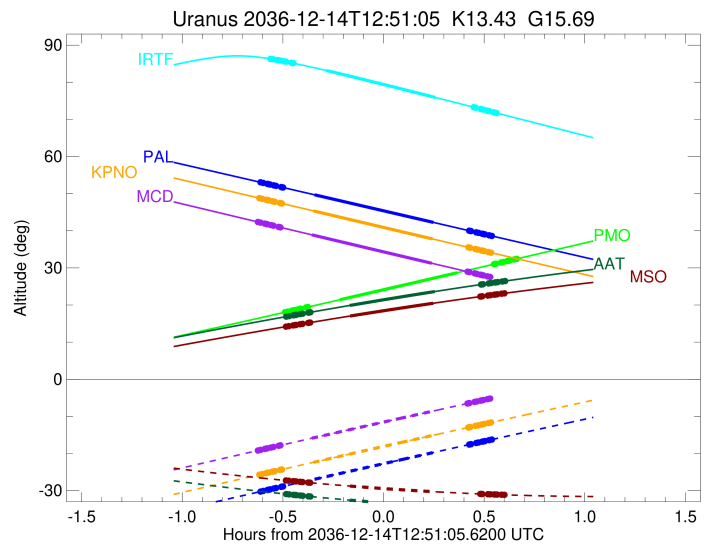
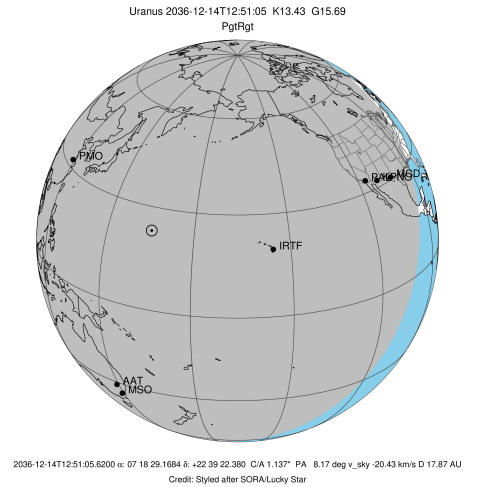
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 14 12:14 - DEC 14 13:23	PieRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	DEC 14 12:21 - DEC 14 13:30	PieRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	DEC 14 12:13 - DEC 14 13:23	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	DEC 14 12:13 - DEC 14 13:22	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	DEC 14 12:17 - DEC 14 13:24	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 14 12:21 - DEC 14 13:27	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+ +	+++++	DEC 14 12:21 - DEC 14 13:27	PieRie



869276916576698368

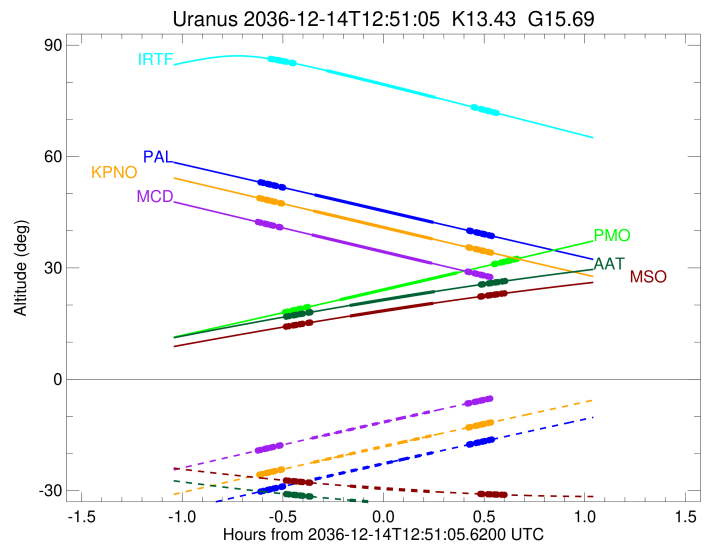
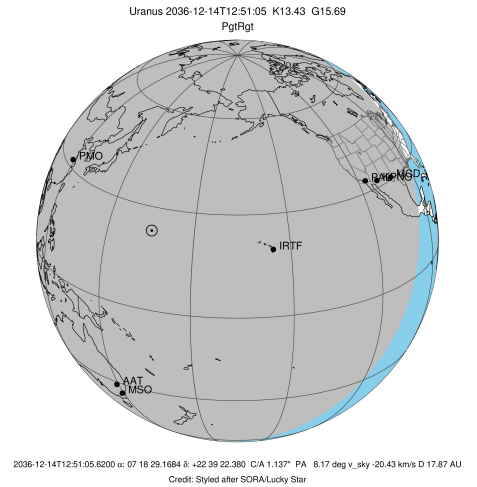
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-12-14T12:48:09.020  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 869276916576698368  
 2Mass ID (if available) : 07182917+2239226  
 ICRS Star Coord at Epoch: 07h 18m 29.16835s +22:39:22.38018s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 13.433  
 G magnitude : 15.688  
 RP magnitude : 14.989  
 BP magnitude : 16.241  
 DUPflag : 0  
 Distance (au) : 17.875  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.43  
 Sun-Target sep (deg) : 154.55  
 Sun-Moon sep (deg) : 117.93  
 B (ring opening deg) : 58.60  
 PA of pole (deg) : 81.99  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.959  
 C/A sky separation (km) : 12426.6  
 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\_itrff93\_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	2036-12-14T12:14:19.144	53.08	-30.27	51318.77	-23.31		
lambda	I	2036-12-14T12:15:14.712	52.89	-30.08	50026.71	-23.23		
delta	I	2036-12-14T12:16:29.117	52.63	-29.83	48300.35	-23.17		
gamma	I	2036-12-14T12:16:58.077	52.53	-29.73	47629.62	-23.15		
eta	I	2036-12-14T12:17:17.676	52.46	-29.66	47176.12	-23.13		
beta	I	2036-12-14T12:18:23.639	52.23	-29.43	45652.48	-23.07		
alpha	I	2036-12-14T12:19:02.753	52.10	-29.30	44752.36	-23.03		
4	I	2036-12-14T12:20:39.206	51.76	-28.97	42528.22	-22.92		
5	I	2036-12-14T12:20:47.836	51.73	-28.94	42314.25	-22.90		
6	I	2036-12-14T12:21:10.484	51.65	-28.86	41826.31	-22.90		
Uranus	I	2036-12-14T12:30:31.135	49.69	-26.94	25157.11		-30.39	-31.56
Uranus	E	2036-12-14T13:05:58.383	42.26	-19.73	25344.48		21.56	22.48
6	E	2036-12-14T13:16:38.781	40.02	-17.59	41869.62	22.83		
5	E	2036-12-14T13:16:52.901	39.97	-17.54	42162.55	22.83		
4	E	2036-12-14T13:17:11.451	39.91	-17.48	42598.80	22.85		
alpha	E	2036-12-14T13:18:42.676	39.59	-17.17	44691.16	22.96		
beta	E	2036-12-14T13:19:24.946	39.44	-17.03	45658.93	22.99		
eta	E	2036-12-14T13:20:30.899	39.21	-16.81	47176.12	23.05		
gamma	E	2036-12-14T13:20:50.204	39.14	-16.75	47621.29	23.07		
delta	E	2036-12-14T13:21:19.627	39.04	-16.65	48300.35	23.09		
lambda	E	2036-12-14T13:22:34.299	38.78	-16.40	50026.71	23.15		
epsilon	E	2036-12-14T13:23:23.609	38.61	-16.24	51168.91	23.23		

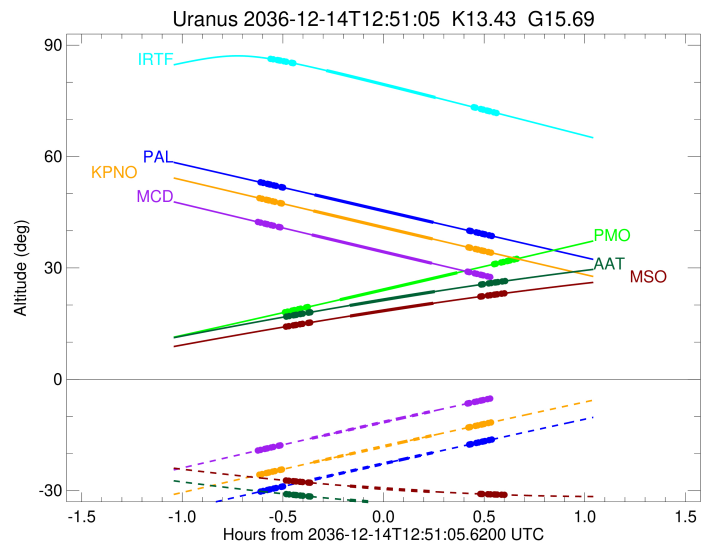
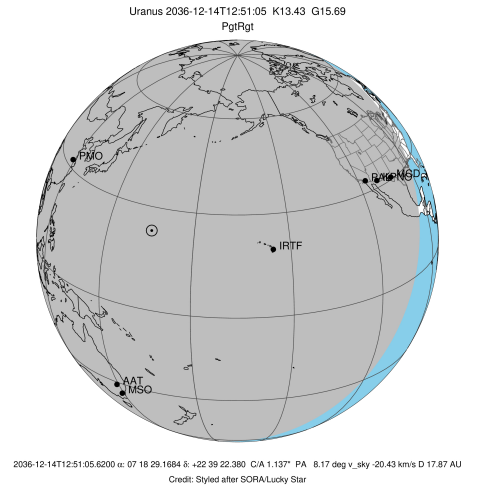
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-12-14T12:55:31.080  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 869276916576698368  
 2Mass ID (if available) : 07182917+2239226  
 ICRS Star Coord at Epoch: 07h 18m 29.16835s +22:39:22.38018s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 13.433  
 G magnitude : 15.688  
 RP magnitude : 14.989  
 BP magnitude : 16.241  
 DUPflag : 0  
 Distance (au) : 17.874  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.43  
 Sun-Target sep (deg) : 154.55  
 Sun-Moon sep (deg) : 117.03  
 B (ring opening deg) : 58.60  
 PA of pole (deg) : 81.99  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.012  
 C/A sky separation (km) : 13120.9  
 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	2036-12-14T12:21:36.082		18.03	-41.43	51319.79	-22.98		
lambda	I	2036-12-14T12:22:32.516		18.22	-41.63	50026.71	-22.89		
delta	I	2036-12-14T12:23:48.028		18.48	-41.89	48300.35	-22.83		
gamma	I	2036-12-14T12:24:17.423		18.58	-42.00	47629.61	-22.80		
eta	I	2036-12-14T12:24:37.316		18.65	-42.07	47176.12	-22.79		
beta	I	2036-12-14T12:25:44.283		18.88	-42.30	45652.39	-22.72		
alpha	I	2036-12-14T12:26:23.990		19.01	-42.44	44752.37	-22.68		
4	I	2036-12-14T12:28:01.947		19.35	-42.79	42528.14	-22.56		
5	I	2036-12-14T12:28:10.714		19.38	-42.82	42314.17	-22.54		
6	I	2036-12-14T12:28:33.701		19.46	-42.90	41826.57	-22.54		
Uranus	I	2036-12-14T12:38:06.110		21.42	-44.92	25160.80		-30.23	-31.39
Uranus	E	2036-12-14T13:13:06.002		28.71	-52.35	25363.44		20.53	21.42
6	E	2036-12-14T13:24:02.663		31.01	-54.66	41870.41	22.65		
5	E	2036-12-14T13:24:16.874		31.06	-54.71	42163.58	22.65		
4	E	2036-12-14T13:24:35.493		31.12	-54.78	42597.75	22.67		
alpha	E	2036-12-14T13:26:07.457		31.44	-55.10	44691.73	22.80		
beta	E	2036-12-14T13:26:49.960		31.59	-55.25	45658.38	22.84		
eta	E	2036-12-14T13:27:56.347		31.83	-55.49	47176.12	22.91		
gamma	E	2036-12-14T13:28:15.764		31.90	-55.56	47621.24	22.93		
delta	E	2036-12-14T13:28:45.358		32.00	-55.66	48300.35	22.96		
lambda	E	2036-12-14T13:30:00.432		32.26	-55.93	50026.71	23.03		
epsilon	E	2036-12-14T13:30:50.440		32.44	-56.10	51179.34	23.12		

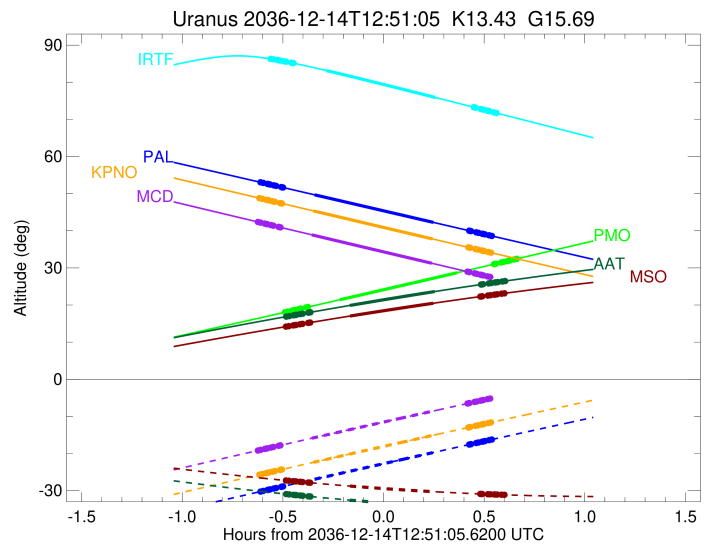
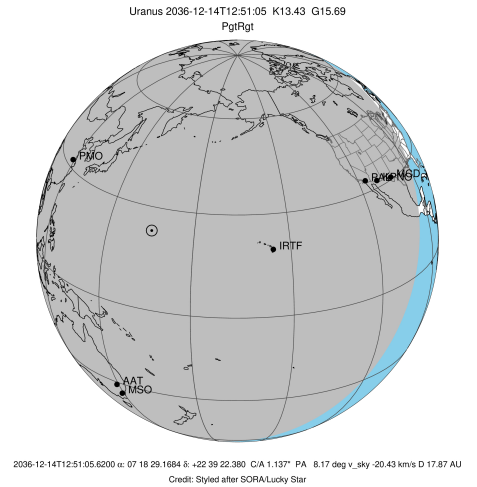
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2036-12-14T12:47:51.370
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       : 869276916576698368
2Mass ID (if available) : 07182917+2239226
ICRS Star Coord at Epoch: 07h 18m 29.16835s +22:39:22.38018s
RUWE (>1.4 is poor) : 0.97
K magnitude          : 13.433
G magnitude          : 15.688
RP magnitude         : 14.989
BP magnitude         : 16.241
DUPflag             : 0
Distance (au)        : 17.875
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -20.43
Sun-Target sep (deg) : 154.55
Sun-Moon sep (deg)  : 117.90
B (ring opening deg) : 58.60
PA of pole (deg)    : 81.99
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.954
C/A sky separation (km) : 12366.8
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_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	2036-12-14T12:13:58.408		48.81	-25.72	51318.44	-23.30		
lambda	I	2036-12-14T12:14:53.999		48.62	-25.53	50026.71	-23.22		
delta	I	2036-12-14T12:16:08.451		48.35	-25.27	48300.35	-23.16		
gamma	I	2036-12-14T12:16:37.430		48.25	-25.17	47629.63	-23.13		
eta	I	2036-12-14T12:16:57.041		48.18	-25.11	47176.12	-23.12		
beta	I	2036-12-14T12:18:03.045		47.94	-24.88	45652.50	-23.05		
alpha	I	2036-12-14T12:18:42.183		47.80	-24.74	44752.36	-23.02		
4	I	2036-12-14T12:20:18.692		47.46	-24.41	42528.24	-22.90		
5	I	2036-12-14T12:20:27.327		47.43	-24.38	42314.26	-22.88		
6	I	2036-12-14T12:20:49.991		47.35	-24.30	41826.26	-22.89		
Uranus	I	2036-12-14T12:30:10.644		45.36	-22.38	25156.65		-30.41	-31.58
Uranus	E	2036-12-14T13:05:43.628		37.80	-15.13	25343.21		21.63	22.55
6	E	2036-12-14T13:16:23.824		35.54	-12.98	41869.57	22.81		
5	E	2036-12-14T13:16:37.957		35.49	-12.94	42162.49	22.81		
4	E	2036-12-14T13:16:56.528		35.42	-12.88	42598.86	22.83		
alpha	E	2036-12-14T13:18:27.831		35.10	-12.57	44691.12	22.94		
beta	E	2036-12-14T13:19:10.144		34.95	-12.43	45658.97	22.97		
eta	E	2036-12-14T13:20:16.160		34.72	-12.21	47176.12	23.03		
gamma	E	2036-12-14T13:20:35.484		34.65	-12.15	47621.29	23.04		
delta	E	2036-12-14T13:21:04.937		34.54	-12.05	48300.35	23.07		
lambda	E	2036-12-14T13:22:19.685		34.28	-11.80	50026.71	23.12		
epsilon	E	2036-12-14T13:23:09.022		34.11	-11.64	51168.32	23.20		

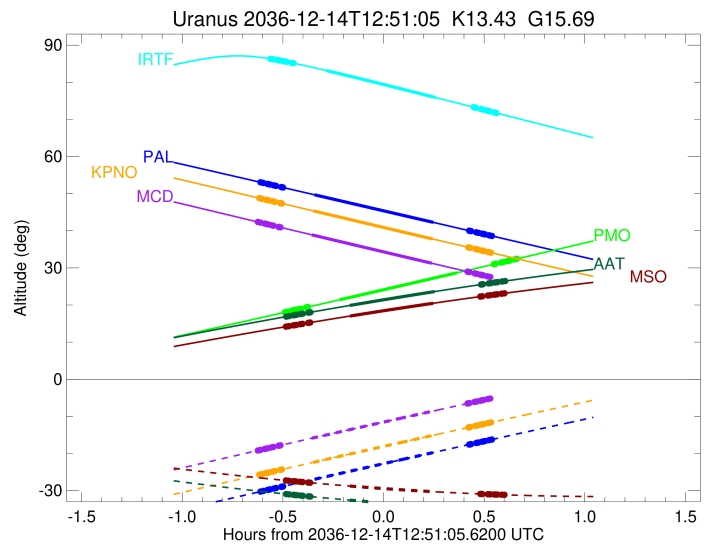
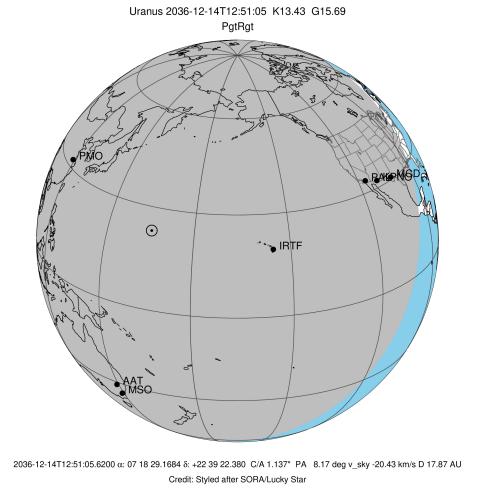
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-12-14T12:47:30.760  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 869276916576698368  
 2Mass ID (if available) : 07182917+2239226  
 ICRS Star Coord at Epoch: 07h 18m 29.16835s +22:39:22.38018s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 13.433  
 G magnitude : 15.688  
 RP magnitude : 14.989  
 BP magnitude : 16.241  
 DUPflag : 0  
 Distance (au) : 17.875  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.43  
 Sun-Target sep (deg) : 154.55  
 Sun-Moon sep (deg) : 117.86  
 B (ring opening deg) : 58.60  
 PA of pole (deg) : 81.99  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.941  
 C/A sky separation (km) : 12200.1  
 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\_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	2036-12-14T12:13:31.606	42.40	-19.21	51317.31	-23.28		
lambda	I	2036-12-14T12:14:27.198	42.20	-19.02	50026.71	-23.20		
delta	I	2036-12-14T12:15:41.714	41.93	-18.77	48300.35	-23.14		
gamma	I	2036-12-14T12:16:10.715	41.82	-18.67	47629.64	-23.11		
eta	I	2036-12-14T12:16:30.343	41.75	-18.60	47176.12	-23.10		
beta	I	2036-12-14T12:17:36.394	41.52	-18.37	45652.56	-23.04		
alpha	I	2036-12-14T12:18:15.562	41.38	-18.24	44752.35	-23.00		
4	I	2036-12-14T12:19:52.128	41.03	-17.91	42528.29	-22.89		
5	I	2036-12-14T12:20:00.767	41.00	-17.88	42314.31	-22.87		
6	I	2036-12-14T12:20:23.456	40.92	-17.80	41826.10	-22.87		
Uranus	I	2036-12-14T12:29:43.491	38.91	-15.88	25155.29		-30.47	-31.63
Uranus	E	2036-12-14T13:05:29.575	31.25	-8.64	25339.92		21.81	22.74
6	E	2036-12-14T13:16:08.394	28.99	-6.53	41869.45	22.79		
5	E	2036-12-14T13:16:22.543	28.94	-6.48	42162.34	22.79		
4	E	2036-12-14T13:16:41.142	28.87	-6.42	42599.02	22.81		
alpha	E	2036-12-14T13:18:12.525	28.55	-6.12	44691.04	22.91		
beta	E	2036-12-14T13:18:54.892	28.40	-5.98	45659.05	22.94		
eta	E	2036-12-14T13:20:00.981	28.16	-5.76	47176.12	23.00		
gamma	E	2036-12-14T13:20:20.330	28.09	-5.70	47621.30	23.02		
delta	E	2036-12-14T13:20:49.819	27.99	-5.60	48300.35	23.04		
lambda	E	2036-12-14T13:22:04.665	27.73	-5.36	50026.71	23.09		
epsilon	E	2036-12-14T13:22:54.006	27.55	-5.19	51166.85	23.17		

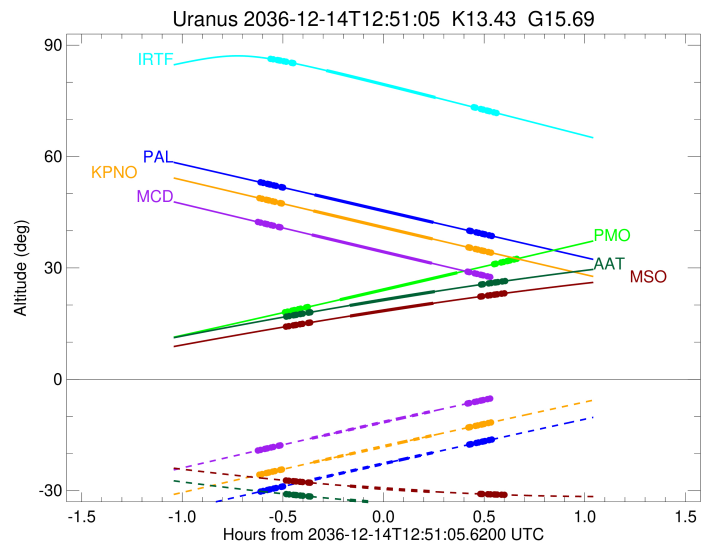
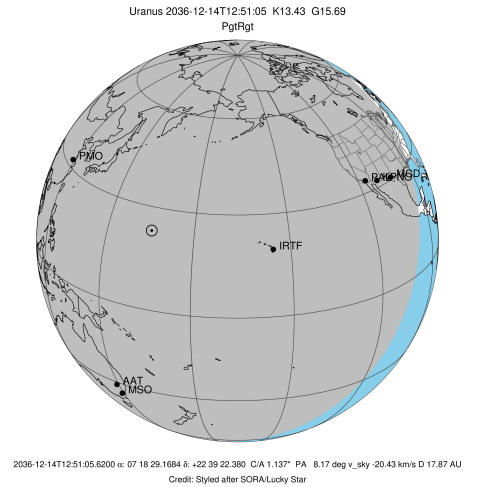


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-12-14T12:50:12.930  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : IRTF  
 Location : Mauna Kea/IRTF  
 Latitude (deg) : 19.82622  
 E. Longitude (deg) : 204.52800  
 Altitude (km) : 4.168  
 Gaia source ID : 869276916576698368  
 2Mass ID (if available) : 07182917+2239226  
 ICRS Star Coord at Epoch: 07h 18m 29.16835s +22:39:22.38018s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 13.433  
 G magnitude : 15.688  
 RP magnitude : 14.989  
 BP magnitude : 16.241  
 DUPflag : 0  
 Distance (au) : 17.875  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.43  
 Sun-Target sep (deg) : 154.55  
 Sun-Moon sep (deg) : 117.96  
 B (ring opening deg) : 58.60  
 PA of pole (deg) : 81.99  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.155  
 C/A sky separation (km) : 14977.1  
 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



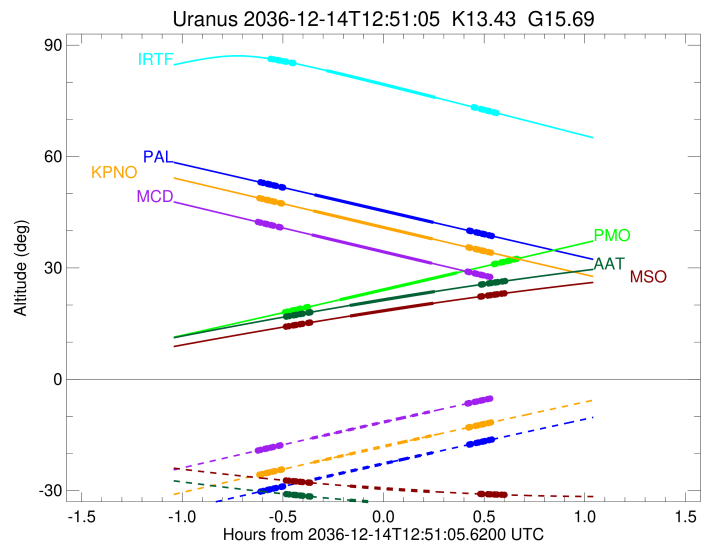
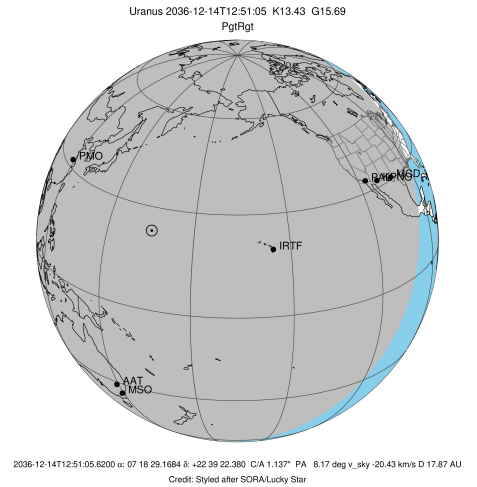
Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2036-12-14T12:17:17.282	86.33	-61.79	51336.90	-23.15		
lambda	I	2036-12-14T12:18:14.082	86.19	-61.57	50026.71	-23.04		
delta	I	2036-12-14T12:19:29.158	85.99	-61.28	48300.35	-22.95		
gamma	I	2036-12-14T12:19:58.414	85.91	-61.17	47629.40	-22.91		
eta	I	2036-12-14T12:20:18.206	85.85	-61.09	47176.12	-22.89		
beta	I	2036-12-14T12:21:24.941	85.66	-60.84	45651.46	-22.80		
alpha	I	2036-12-14T12:22:04.470	85.55	-60.69	44752.43	-22.74		
4	I	2036-12-14T12:23:42.271	85.25	-60.31	42527.43	-22.58		
5	I	2036-12-14T12:23:51.049	85.22	-60.28	42313.31	-22.55		
6	I	2036-12-14T12:24:13.836	85.15	-60.19	41828.91	-22.54		
Uranus	I	2036-12-14T12:34:01.840	83.17	-57.94	25184.67		-29.20	-30.34
Uranus	E	2036-12-14T13:06:36.793	75.90	-50.47	25395.54		18.68	19.50
6	E	2036-12-14T13:17:59.052	73.29	-47.86	41871.40	22.53		
5	E	2036-12-14T13:18:13.316	73.24	-47.81	42165.00	22.54		
4	E	2036-12-14T13:18:31.925	73.16	-47.73	42596.36	22.57		
alpha	E	2036-12-14T13:20:04.359	72.81	-47.38	44692.47	22.73		
beta	E	2036-12-14T13:20:46.922	72.65	-47.22	45657.71	22.78		
eta	E	2036-12-14T13:21:53.481	72.39	-46.97	47176.12	22.88		
gamma	E	2036-12-14T13:22:12.927	72.32	-46.89	47621.19	22.90		
delta	E	2036-12-14T13:22:42.561	72.20	-46.78	48300.35	22.94		
lambda	E	2036-12-14T13:23:57.690	71.91	-46.49	50026.71	23.02		
epsilon	E	2036-12-14T13:24:48.204	71.72	-46.30	51190.89	23.13		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-12-14T12:53:33.520  
 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 : 869276916576698368  
 2Mass ID (if available) : 07182917+2239226  
 ICRS Star Coord at Epoch: 07h 18m 29.16835s +22:39:22.38018s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 13.433  
 G magnitude : 15.688  
 RP magnitude : 14.989  
 BP magnitude : 16.241  
 DUPflag : 0  
 Distance (au) : 17.874  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.43  
 Sun-Target sep (deg) : 154.55  
 Sun-Moon sep (deg) : 117.10  
 B (ring opening deg) : 58.60  
 PA of pole (deg) : 81.99  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.536  
 C/A sky separation (km) : 19914.8  
 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\_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	2036-12-14T12:21:56.723		16.85	-30.92	51371.04	-22.10		
lambda	I	2036-12-14T12:22:57.863		17.02	-31.01	50026.71	-21.93		
delta	I	2036-12-14T12:24:16.845		17.23	-31.13	48300.35	-21.78		
gamma	I	2036-12-14T12:24:47.719		17.31	-31.18	47628.92	-21.71		
eta	I	2036-12-14T12:25:08.592		17.37	-31.21	47176.12	-21.67		
beta	I	2036-12-14T12:26:19.290		17.56	-31.32	45649.55	-21.50		
alpha	I	2036-12-14T12:27:01.140		17.67	-31.38	44752.23	-21.40		
4	I	2036-12-14T12:28:45.433		17.95	-31.54	42526.34	-21.11		
5	I	2036-12-14T12:28:54.949		17.98	-31.55	42310.53	-21.06		
6	I	2036-12-14T12:29:18.836		18.04	-31.59	41834.20	-21.03		
Uranus	I	2036-12-14T12:41:02.240		19.88	-32.55	25275.35		-25.06	-26.09
Uranus	E	2036-12-14T13:06:21.419		23.63	-34.22	25496.43		11.40	11.92
6	E	2036-12-14T13:20:11.164		25.52	-34.87	41874.56	21.10		
5	E	2036-12-14T13:20:26.344		25.56	-34.88	42171.00	21.13		
4	E	2036-12-14T13:20:45.750		25.60	-34.89	42591.02	21.18		
alpha	E	2036-12-14T13:22:24.339		25.82	-34.95	44695.46	21.48		
beta	E	2036-12-14T13:23:09.072		25.91	-34.98	45655.26	21.58		
eta	E	2036-12-14T13:24:19.313		26.07	-35.02	47176.12	21.75		
gamma	E	2036-12-14T13:24:39.744		26.11	-35.04	47621.04	21.80		
delta	E	2036-12-14T13:25:10.859		26.18	-35.05	48300.35	21.87		
lambda	E	2036-12-14T13:26:29.523		26.35	-35.10	50026.71	22.02		
epsilon	E	2036-12-14T13:27:24.266		26.46	-35.13	51235.13	22.20		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-12-14T12:53:23.680  
 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 : 869276916576698368  
 2Mass ID (if available) : 07182917+2239226  
 ICRS Star Coord at Epoch: 07h 18m 29.16835s +22:39:22.38018s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 13.433  
 G magnitude : 15.688  
 RP magnitude : 14.989  
 BP magnitude : 16.241  
 DUPflag : 0  
 Distance (au) : 17.874  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.43  
 Sun-Target sep (deg) : 154.55  
 Sun-Moon sep (deg) : 117.07  
 B (ring opening deg) : 58.60  
 PA of pole (deg) : 81.99  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.555  
 C/A sky separation (km) : 20163.1  
 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\_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	2036-12-14T12:21:50.987		14.15	-27.25	51372.89	-22.04		
lambda	I	2036-12-14T12:22:52.390		14.31	-27.34	50026.71	-21.87		
delta	I	2036-12-14T12:24:11.618		14.51	-27.45	48300.35	-21.71		
gamma	I	2036-12-14T12:24:42.594		14.59	-27.50	47628.89	-21.64		
eta	I	2036-12-14T12:25:03.536		14.64	-27.52	47176.12	-21.60		
beta	I	2036-12-14T12:26:14.486		14.82	-27.62	45649.44	-21.42		
alpha	I	2036-12-14T12:26:56.486		14.93	-27.68	44752.21	-21.32		
4	I	2036-12-14T12:28:41.196		15.19	-27.82	42526.30	-21.02		
5	I	2036-12-14T12:28:50.763		15.22	-27.84	42310.34	-20.97		
6	I	2036-12-14T12:29:14.721		15.28	-27.87	41834.49	-20.94		
Uranus	I	2036-12-14T12:41:07.004		17.03	-28.77	25281.75		-24.75	-25.77
Uranus	E	2036-12-14T13:05:57.228		20.48	-30.28	25501.05		10.96	11.47
6	E	2036-12-14T13:19:57.523		22.27	-30.89	41874.70	21.00		
5	E	2036-12-14T13:20:12.770		22.31	-30.89	42171.32	21.04		
4	E	2036-12-14T13:20:32.238		22.35	-30.91	42590.75	21.09		
alpha	E	2036-12-14T13:22:11.258		22.55	-30.97	44695.61	21.40		
beta	E	2036-12-14T13:22:56.151		22.64	-30.99	45655.15	21.50		
eta	E	2036-12-14T13:24:06.653		22.78	-31.03	47176.12	21.68		
gamma	E	2036-12-14T13:24:27.156		22.83	-31.04	47621.03	21.72		
delta	E	2036-12-14T13:24:58.377		22.89	-31.06	48300.35	21.79		
lambda	E	2036-12-14T13:26:17.298		23.05	-31.10	50026.71	21.95		
epsilon	E	2036-12-14T13:27:12.306		23.16	-31.13	51237.21	22.13		