

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-10-13T22:01:31.530
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3416213864799115264
 2Mass ID (if available) : 05264072+2317512

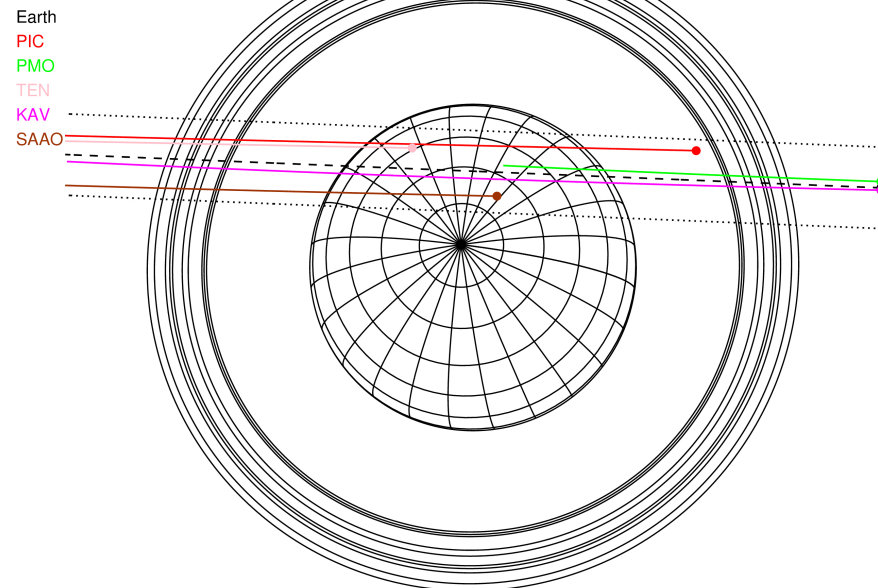
Uranus 2030-10-13T22:01:31 K10.15 G12.33 PgtRgt

ICRS Star Coord at Epoch: 05h 26m 40.70043s +23:17:50.97601s

RUWE (>1.4 is poor) : 4.75
 K magnitude : 10.149
 G magnitude : 12.326
 RP magnitude : 11.605
 BP magnitude : 12.885
 DUPflag : 0
 Distance (au) : 18.680
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -7.56
 Sun-Target sep (deg) : 117.83
 Sun-Moon sep (deg) : 34.29
 B (ring opening deg) : 80.90
 PA of pole (deg) : 27.62



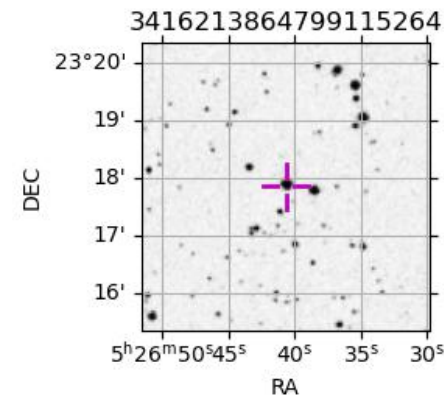
2030-10-13T22:01:31.5300 α: 05 26 40.7004 s: +23 17 50.976 C/A 1.120° PA 177.66 deg v_sky - 7.56 km/s D 18.68 AU
 Credit: Styled after SORA/Lucky Star



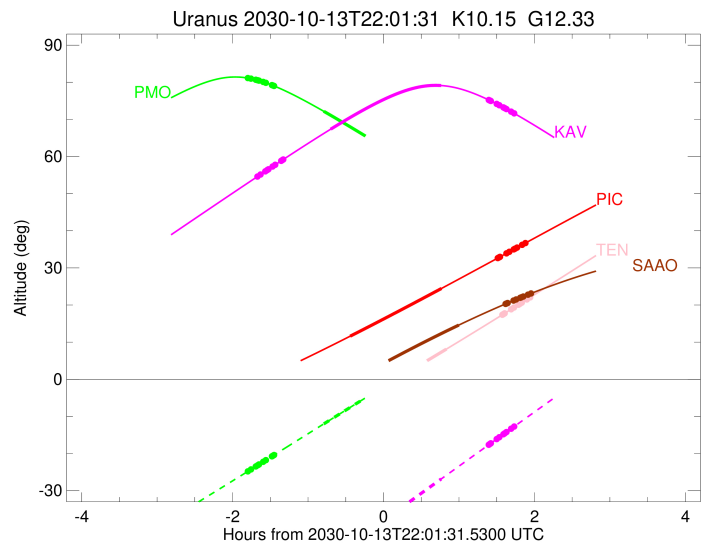
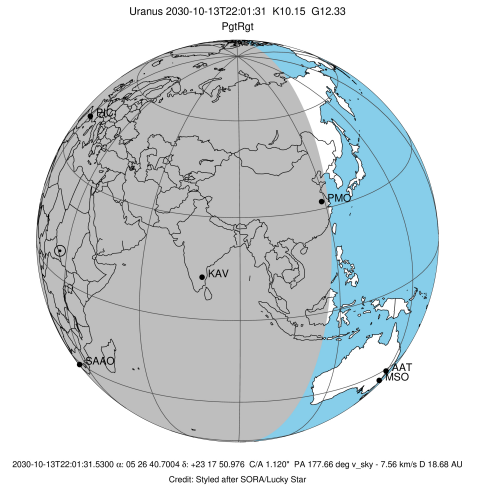
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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		+	+++++	OCT 13 21:34 - OCT 13 23:54	PieRne
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+		OCT 13 20:13 - OCT 13 21:13	PinRin
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5		+	+++++	OCT 13 22:51 - OCT 13 23:58	PneRne
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+	+++++	OCT 13 20:21 - OCT 13 23:45	PieRie
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					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8		+	+++++	OCT 13 23:01 - OCT 13 23:58	PneRne
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

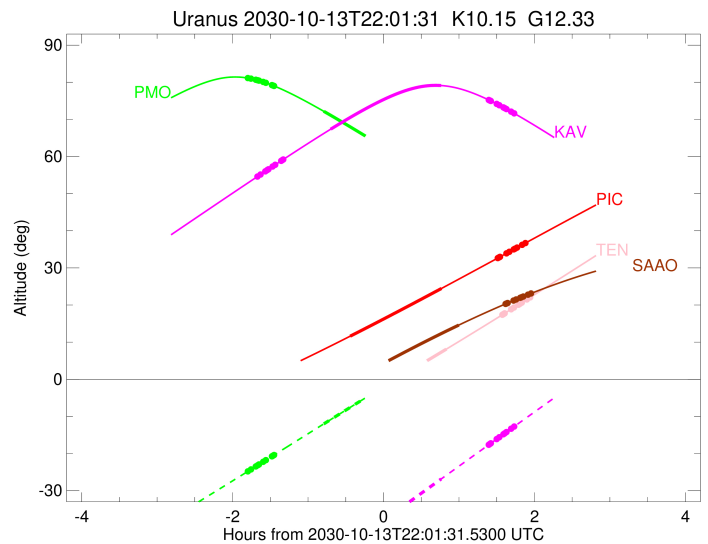
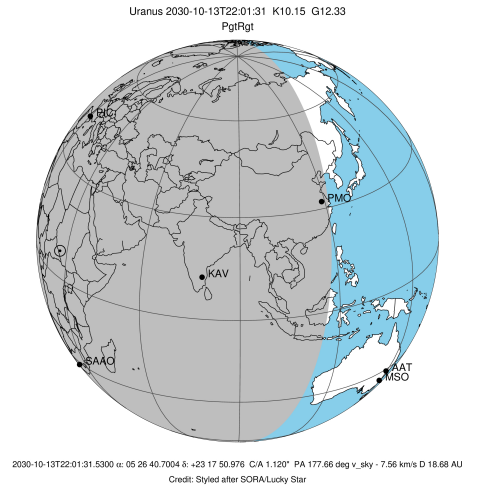


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-10-13T22:12:14.480
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3416213864799115264
 2Mass ID (if available) : 05264072+2317512
 ICRS Star Coord at Epoch: 05h 26m 40.70043s +23:17:50.97601s
 RUWE (>1.4 is poor) : 4.75
 K magnitude : 10.149
 G magnitude : 12.326
 RP magnitude : 11.605
 BP magnitude : 12.885
 DUPflag : 0
 Distance (au) : 18.680
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -7.56
 Sun-Target sep (deg) : 117.83
 Sun-Moon sep (deg) : 33.89
 B (ring opening deg) : 80.90
 PA of pole (deg) : 27.62
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.410
 C/A sky separation (km) : 19098.4
 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



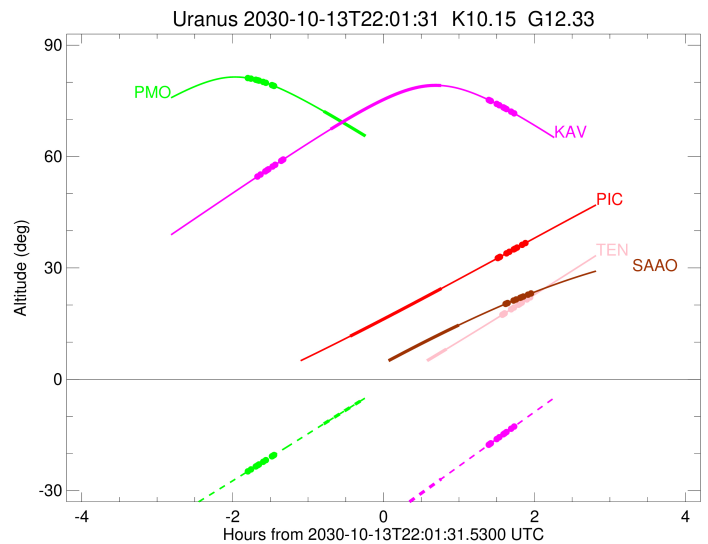
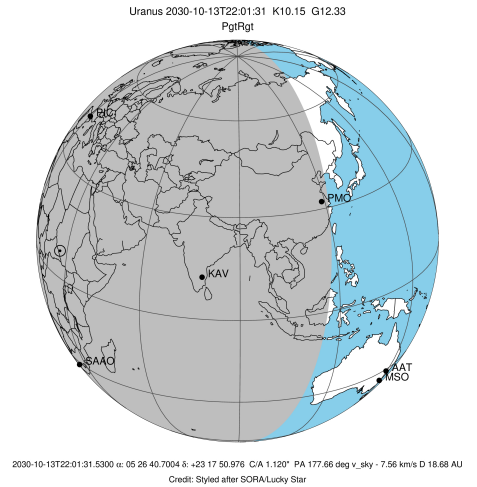
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-10-13T20:26:15.430		0.31x	-34.33	51324.59	-6.89		
lambda	I	2030-10-13T20:29:24.733		0.80x	-34.86	50026.71	-6.84		
delta	I	2030-10-13T20:33:37.669		1.46x	-35.56	48300.35	-6.81		
gamma	I	2030-10-13T20:35:16.098		1.72x	-35.83	47631.17	-6.79		
eta	I	2030-10-13T20:36:23.166		1.90x	-36.02	47176.12	-6.78		
beta	I	2030-10-13T20:40:10.263		2.50x	-36.64	45641.11	-6.74		
alpha	I	2030-10-13T20:42:25.511		2.86x	-37.01	44731.51	-6.71		
4	I	2030-10-13T20:47:42.640		3.71x	-37.87	42613.75	-6.64		
5	I	2030-10-13T20:48:34.071		3.85x	-38.01	42272.91	-6.63		
6	I	2030-10-13T20:49:41.329		4.03x	-38.19	41827.29	-6.61		
Uranus	I	2030-10-13T21:34:57.563		11.59	-45.01	25492.88		3.04	3.18
Uranus	E	2030-10-13T22:47:34.628		24.46	-53.05	25008.96		8.93	9.34
6	E	2030-10-13T23:32:27.127		32.66	-55.21	41876.84	6.88		
5	E	2030-10-13T23:33:22.953		32.83	-55.23	42270.53	6.90		
4	E	2030-10-13T23:34:05.652		32.96	-55.24	42559.06	6.91		
alpha	E	2030-10-13T23:39:17.901		33.92	-55.30	44734.85	7.00		
beta	E	2030-10-13T23:41:31.967		34.33	-55.32	45675.10	7.04		
eta	E	2030-10-13T23:45:04.533		34.98	-55.33	47176.12	7.09		
gamma	E	2030-10-13T23:46:07.706		35.18	-55.33	47624.50	7.11		
delta	E	2030-10-13T23:47:42.681		35.47	-55.33	48300.35	7.13		
lambda	E	2030-10-13T23:51:44.013		36.21	-55.31	50026.71	7.18		
epsilon	E	2030-10-13T23:54:37.424		36.74	-55.28	51274.69	7.24		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-10-13T21:55:32.720
 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 : 3416213864799115264
 2Mass ID (if available) : 05264072+2317512
 ICRS Star Coord at Epoch: 05h 26m 40.70043s +23:17:50.97601s
 RUWE (>1.4 is poor) : 4.75
 K magnitude : 10.149
 G magnitude : 12.326
 RP magnitude : 11.605
 BP magnitude : 12.885
 DUPflag : 0
 Distance (au) : 18.680
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -7.56
 Sun-Target sep (deg) : 117.83
 Sun-Moon sep (deg) : 35.07
 B (ring opening deg) : 80.90
 PA of pole (deg) : 27.62
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.194
 C/A sky separation (km) : 16173.6
 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



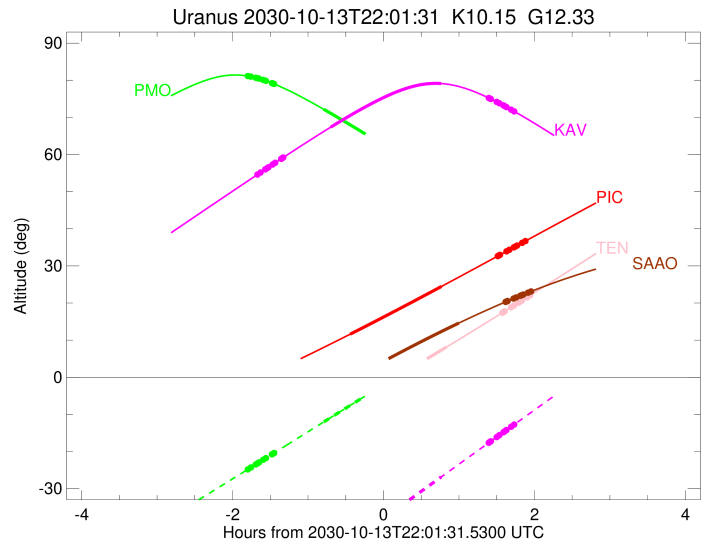
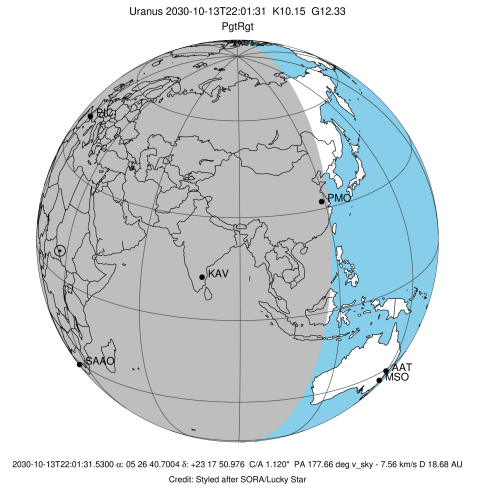
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-10-13T20:13:23.851		81.15	-24.87	51293.97	-7.56		
lambda	I	2030-10-13T20:16:12.099		80.98	-24.28	50026.71	-7.52		
delta	I	2030-10-13T20:20:02.109		80.68	-23.47	48300.35	-7.49		
gamma	I	2030-10-13T20:21:31.566		80.55	-23.15	47630.98	-7.48		
eta	I	2030-10-13T20:22:32.449		80.45	-22.94	47176.12	-7.47		
beta	I	2030-10-13T20:25:58.521		80.09	-22.21	45641.06	-7.43		
alpha	I	2030-10-13T20:28:01.487		79.85	-21.78	44728.53	-7.41		
4	I	2030-10-13T20:32:48.159		79.25	-20.77	42612.01	-7.35		
5	I	2030-10-13T20:33:35.480		79.14	-20.60	42265.77	-7.35		
6	I	2030-10-13T20:34:35.623		79.01	-20.39	41823.23	-7.33		
Uranus	I	2030-10-13T21:13:59.328		72.19	-12.03	25544.60		1.42	1.48
Uranus	E	2030-10-13T22:35:50.662		55.29	5.16x	25048.35		8.59	8.99
6	E	2030-10-13T23:16:16.769		46.69	13.42x	41876.01	7.26		
5	E	2030-10-13T23:17:09.307		46.50	13.59x	42266.93	7.28		
4	E	2030-10-13T23:17:50.017		46.36	13.73x	42556.95	7.28		
alpha	E	2030-10-13T23:22:47.297		45.31	14.72x	44733.52	7.34		
beta	E	2030-10-13T23:24:55.645		44.85	15.15x	45675.70	7.36		
eta	E	2030-10-13T23:28:19.235		44.13	15.83x	47176.12	7.39		
gamma	E	2030-10-13T23:29:19.871		43.91	16.03x	47624.30	7.40		
delta	E	2030-10-13T23:30:51.205		43.59	16.33x	48300.35	7.41		
lambda	E	2030-10-13T23:34:43.787		42.77	17.10x	50026.71	7.44		
epsilon	E	2030-10-13T23:37:29.670		42.18	17.64x	51261.88	7.47		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-10-13T22:14:11.200
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3416213864799115264
 2Mass ID (if available) : 05264072+2317512
 ICRS Star Coord at Epoch: 05h 26m 40.70043s +23:17:50.97601s
 RUWE (>1.4 is poor) : 4.75
 K magnitude : 10.149
 G magnitude : 12.326
 RP magnitude : 11.605
 BP magnitude : 12.885
 DUPflag : 0
 Distance (au) : 18.680
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -7.56
 Sun-Target sep (deg) : 117.83
 Sun-Moon sep (deg) : 33.64
 B (ring opening deg) : 80.90
 PA of pole (deg) : 27.62
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.367
 C/A sky separation (km) : 18520.1
 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	2030-10-13T20:25:52.870	-19.32x	-24.41	51320.60	-6.80			
lambda	I	2030-10-13T20:29:04.100	-18.79x	-25.11	50026.71	-6.75			
delta	I	2030-10-13T20:33:20.293	-18.07x	-26.05	48300.35	-6.72			
gamma	I	2030-10-13T20:34:59.958	-17.79x	-26.41	47631.15	-6.71			
eta	I	2030-10-13T20:36:07.850	-17.60x	-26.66	47176.12	-6.70			
beta	I	2030-10-13T20:39:57.677	-16.95x	-27.50	45641.09	-6.66			
alpha	I	2030-10-13T20:42:14.545	-16.56x	-28.00	44731.11	-6.64			
4	I	2030-10-13T20:47:35.102	-15.63x	-29.18	42613.54	-6.57			
5	I	2030-10-13T20:48:27.201	-15.48x	-29.37	42271.94	-6.57			
6	I	2030-10-13T20:49:35.060	-15.28x	-29.61	41826.72	-6.55			
Uranus	I	2030-10-13T21:34:50.577	-7.03x	-39.44	25504.17			2.77	2.90
Uranus	E	2030-10-13T22:51:31.293	8.12	-55.21	25017.96			8.85	9.26
6	E	2030-10-13T23:36:07.483	17.40	-63.11	41876.53	6.86			
5	E	2030-10-13T23:37:03.328	17.59	-63.25	42269.15	6.88			
4	E	2030-10-13T23:37:46.244	17.74	-63.36	42558.24	6.89			
alpha	E	2030-10-13T23:42:59.621	18.85	-64.16	44734.31	6.98			
beta	E	2030-10-13T23:45:14.312	19.32	-64.49	45675.35	7.01			
eta	E	2030-10-13T23:48:47.706	20.07	-65.00	47176.12	7.06			
gamma	E	2030-10-13T23:49:51.135	20.30	-65.15	47624.41	7.08			
delta	E	2030-10-13T23:51:26.533	20.64	-65.37	48300.35	7.10			
lambda	E	2030-10-13T23:55:28.946	21.50	-65.91	50026.71	7.15			
epsilon	E	2030-10-13T23:58:22.287	22.11	-66.28	51268.42	7.20			

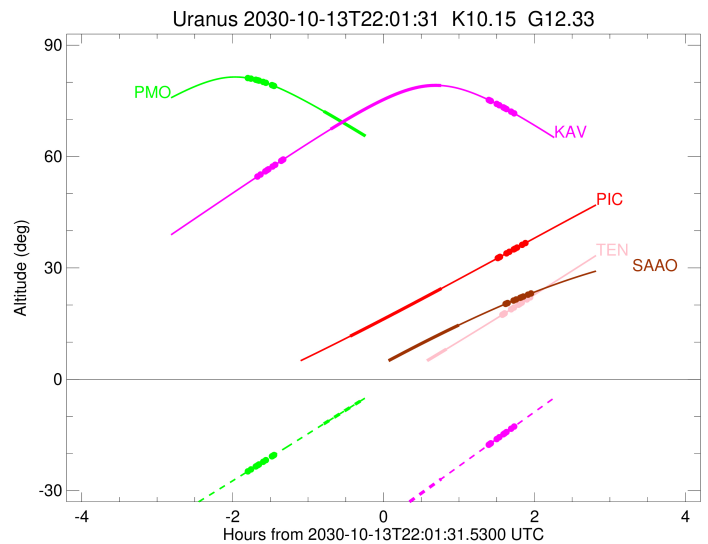
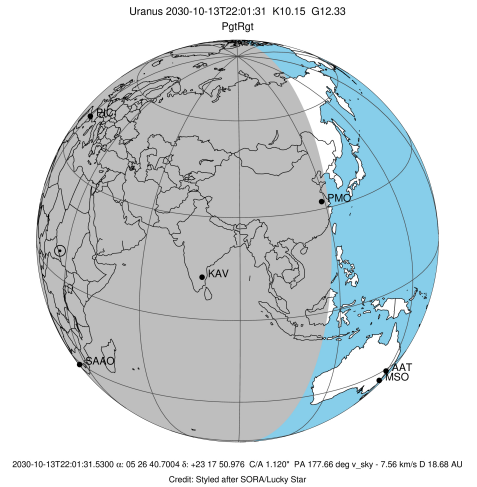
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-10-13T22:04:07.700
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 3416213864799115264
 2Mass ID (if available) : 05264072+2317512
 ICRS Star Coord at Epoch: 05h 26m 40.70043s +23:17:50.97601s
 RUWE (>1.4 is poor) : 4.75
 K magnitude : 10.149
 G magnitude : 12.326
 RP magnitude : 11.605
 BP magnitude : 12.885
 DUPflag : 0
 Distance (au) : 18.680
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -7.56
 Sun-Target sep (deg) : 117.83
 Sun-Moon sep (deg) : 34.66
 B (ring opening deg) : 80.90
 PA of pole (deg) : 27.62
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.029
 C/A sky separation (km) : 13945.8
 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_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	2030-10-13T20:21:03.345		54.55	-62.53	51281.76	-7.64		
lambda	I	2030-10-13T20:23:48.112		55.17	-61.86	50026.71	-7.61		
delta	I	2030-10-13T20:27:35.208		56.02	-60.94	48300.35	-7.59		
gamma	I	2030-10-13T20:29:03.430		56.35	-60.59	47630.89	-7.58		
eta	I	2030-10-13T20:30:03.414		56.57	-60.35	47176.12	-7.58		
beta	I	2030-10-13T20:33:26.245		57.33	-59.52	45641.09	-7.56		
alpha	I	2030-10-13T20:35:27.269		57.78	-59.03	44727.24	-7.55		
4	I	2030-10-13T20:40:08.348		58.83	-57.89	42611.13	-7.51		
5	I	2030-10-13T20:40:55.046		59.00	-57.71	42262.54	-7.51		
6	I	2030-10-13T20:41:53.627		59.22	-57.47	41821.49	-7.49		
Uranus	I	2030-10-13T21:19:31.353		67.36	-48.30	25556.71		0.56	0.59
Uranus	E	2030-10-13T22:47:25.663		79.12	-26.85	25098.54		8.14	8.52
6	E	2030-10-13T23:25:18.121		75.22	-17.63	41874.70	7.60		
5	E	2030-10-13T23:26:07.862		75.09	-17.43	42261.75	7.61		
4	E	2030-10-13T23:26:47.076		74.98	-17.27	42554.03	7.62		
alpha	E	2030-10-13T23:31:31.695		74.18	-16.11	44731.49	7.66		
beta	E	2030-10-13T23:33:35.022		73.82	-15.61	45676.56	7.68		
eta	E	2030-10-13T23:36:50.101		73.24	-14.82	47176.12	7.70		
gamma	E	2030-10-13T23:37:48.230		73.06	-14.59	47624.00	7.71		
delta	E	2030-10-13T23:39:15.912		72.79	-14.23	48300.35	7.72		
lambda	E	2030-10-13T23:42:59.220		72.09	-13.33	50026.71	7.74		
epsilon	E	2030-10-13T23:45:35.635		71.60	-12.69	51238.98	7.77		


```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-10-13T22:13:08.320
Event type           : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code        : SAAO
Location             : So. Afr. Astro. Obs. (Sutherland)
Latitude (deg)       : -32.37953
E. Longitude (deg)   : 20.81070
Altitude (km)        : 1.768
Gaia source ID       : 3416213864799115264
2Mass ID (if available) : 05264072+2317512
ICRS Star Coord at Epoch: 05h 26m 40.70043s +23:17:50.97601s
RUWE (>1.4 is poor) : 4.75
K magnitude           : 10.149
G magnitude           : 12.326
RP magnitude          : 11.605
BP magnitude          : 12.885
DUPflag              : 0
Distance (au)        : 18.680
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -7.56
Sun-Target sep (deg) : 117.83
Sun-Moon sep (deg)   : 33.74
B (ring opening deg) : 80.90
PA of pole (deg)     : 27.62
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.831
C/A sky separation (km) : 11252.6
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_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	2030-10-13T20:23:53.532	-14.50x	-40.77	51264.32	-7.35		
lambda	I	2030-10-13T20:26:42.177	-13.94x	-41.15	50026.71	-7.34		
delta	I	2030-10-13T20:30:37.594	-13.15x	-41.68	48300.35	-7.33		
gamma	I	2030-10-13T20:32:08.968	-12.85x	-41.88	47630.75	-7.33		
eta	I	2030-10-13T20:33:11.030	-12.64x	-42.01	47176.12	-7.32		
beta	I	2030-10-13T20:36:40.731	-11.95x	-42.46	45641.17	-7.32		
alpha	I	2030-10-13T20:38:45.949	-11.53x	-42.72	44725.49	-7.31		
4	I	2030-10-13T20:43:35.561	-10.57x	-43.32	42609.85	-7.29		
5	I	2030-10-13T20:44:24.116	-10.41x	-43.41	42258.19	-7.29		
6	I	2030-10-13T20:45:23.991	-10.22x	-43.53	41819.23	-7.29		
Uranus	I	2030-10-13T21:23:20.055	-2.84x	-47.32	25557.69		-0.43	-0.45
Uranus	E	2030-10-13T23:01:24.633	14.60	-48.69	25167.11		7.49	7.84
6	E	2030-10-13T23:38:39.943	20.31	-45.85	41872.90	7.60		
5	E	2030-10-13T23:39:29.155	20.43	-45.77	42255.43	7.61		
4	E	2030-10-13T23:40:08.748	20.53	-45.70	42550.65	7.61		
alpha	E	2030-10-13T23:44:53.788	21.20	-45.22	44728.99	7.65		
beta	E	2030-10-13T23:46:57.768	21.49	-45.00	45677.51	7.66		
eta	E	2030-10-13T23:50:13.156	21.95	-44.65	47176.12	7.68		
gamma	E	2030-10-13T23:51:11.389	22.08	-44.54	47623.65	7.69		
delta	E	2030-10-13T23:52:39.360	22.28	-44.38	48300.35	7.70		
lambda	E	2030-10-13T23:56:23.353	22.79	-43.95	50026.71	7.72		
epsilon	E	2030-10-13T23:58:56.664	23.13	-43.65	51210.91	7.74		