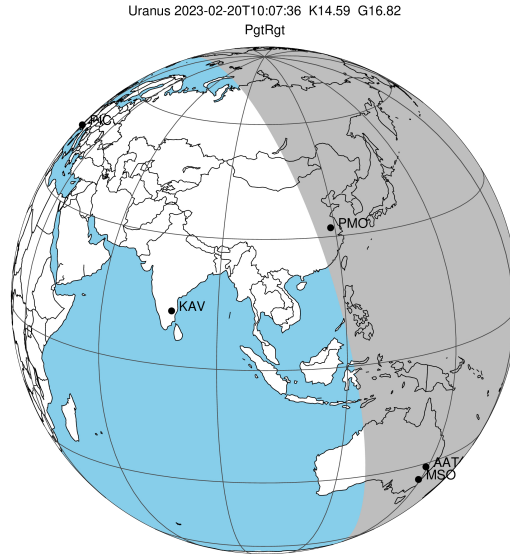


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-02-20T10:07:36.480
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 33482813421031424
 2Mass ID (if available) : 02502685+1600195

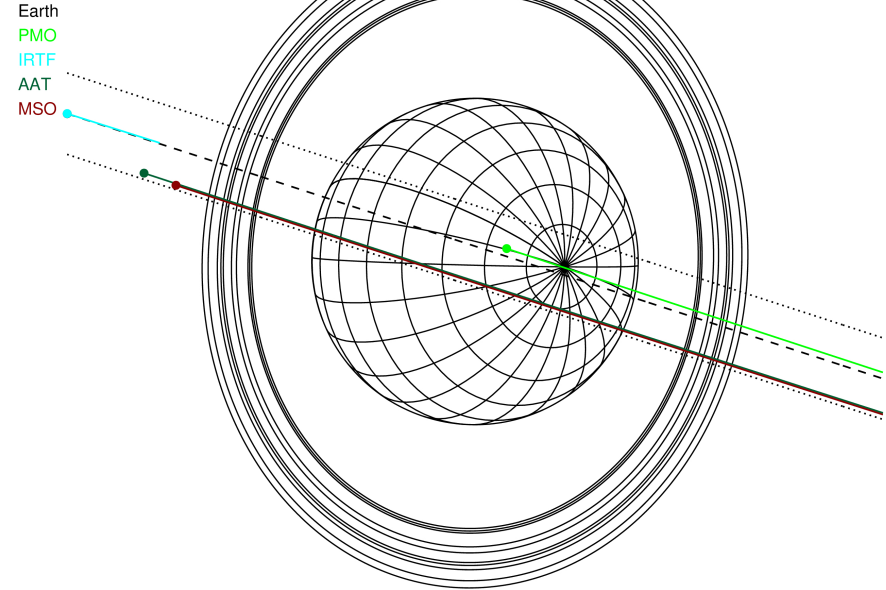
Uranus 2023-02-20T10:07:36 K14.59 G16.82 PgtRgt

ICRS Star Coord at Epoch: 02h 50m 26.86647s +16:00:19.69250s

RUWE (>1.4 is poor) : 1.09
 K magnitude : 14.591
 G magnitude : 16.821
 RP magnitude : 16.131
 BP magnitude : 17.354
 DUPflag : 0
 Distance (au) : 19.915
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 14.68
 Sun-Target sep (deg) : 73.79
 Sun-Moon sep (deg) : 72.04
 B (ring opening deg) : 56.61
 PA of pole (deg) : -93.42



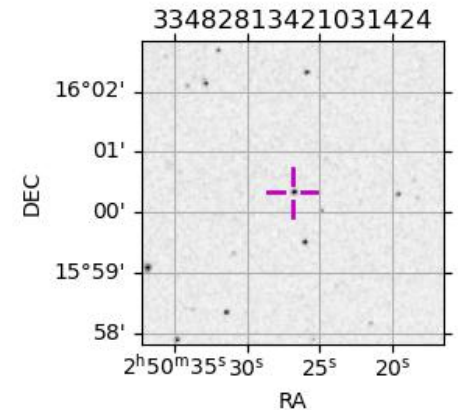
2023-02-20T10:07:36.4800 ex: 02 50 26.8665 s: +16 00 19.693 C/A 0.159° PA 162.00 deg v_sky +14.68 km/s D 19.92 AU
 Credit: Styled after SORA/Lucky Star



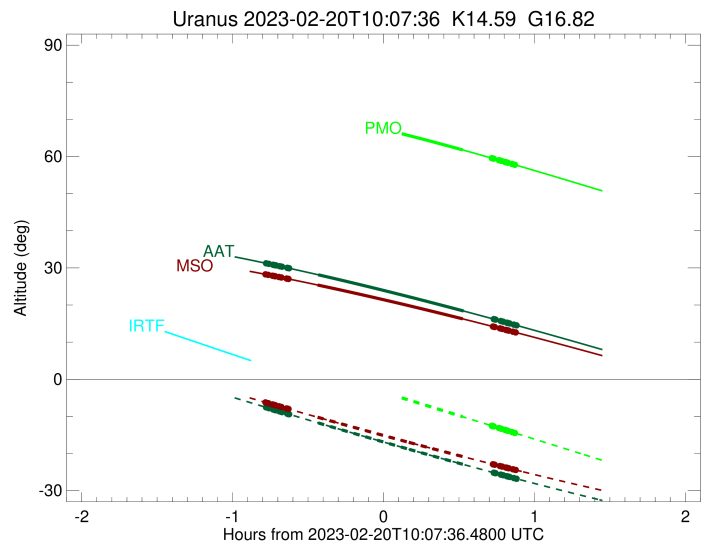
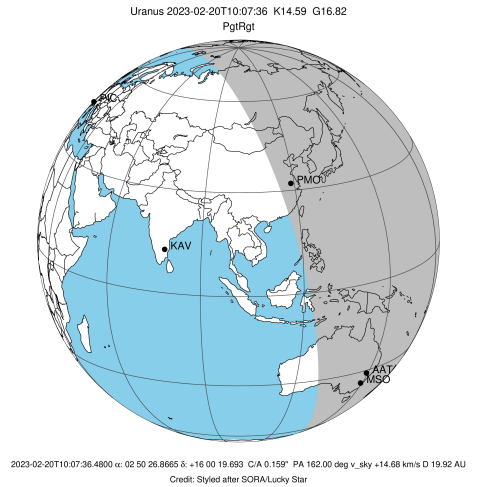
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8		+	+++++++	FEB 20 10:39 - FEB 20 10:59	PneRne
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					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
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	+++++++	+ +	+++++++	FEB 20 09:20 - FEB 20 11:00	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++++	+ +	+++++++	FEB 20 09:20 - FEB 20 10:59	PieRie

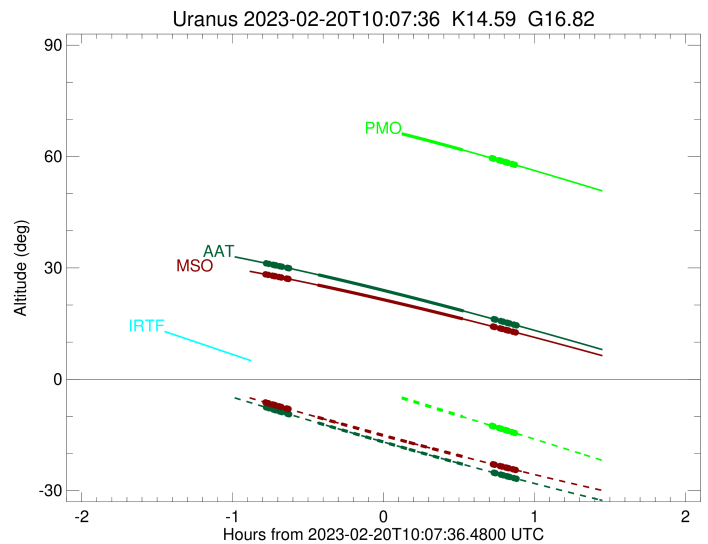
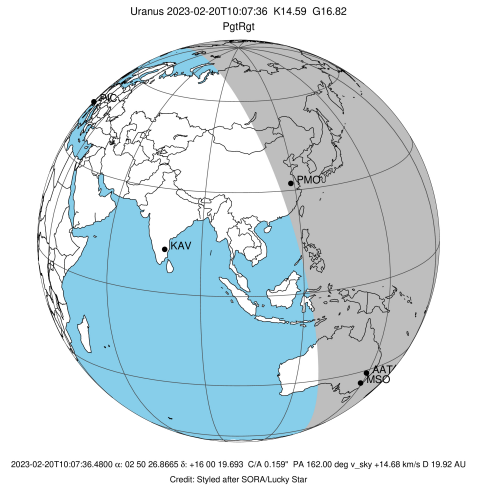


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-02-20T10:10:07.070
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 33482813421031424
 2Mass ID (if available) : 02502685+1600195
 ICRS Star Coord at Epoch: 02h 50m 26.86647s +16:00:19.69250s
 RUWE (>1.4 is poor) : 1.09
 K magnitude : 14.591
 G magnitude : 16.821
 RP magnitude : 16.131
 BP magnitude : 17.354
 DUPflag : 0
 Distance (au) : 19.915
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 14.68
 Sun-Target sep (deg) : 73.79
 Sun-Moon sep (deg) : 73.04
 B (ring opening deg) : 56.61
 PA of pole (deg) : -93.42
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.241
 C/A sky separation (km) : 3477.9
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



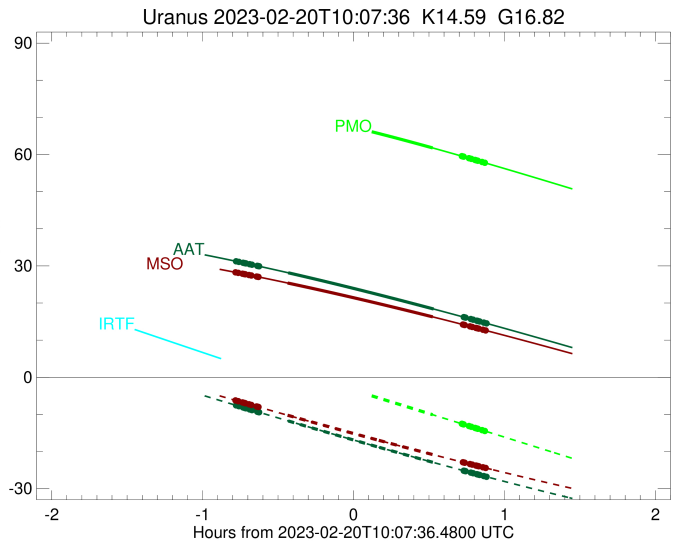
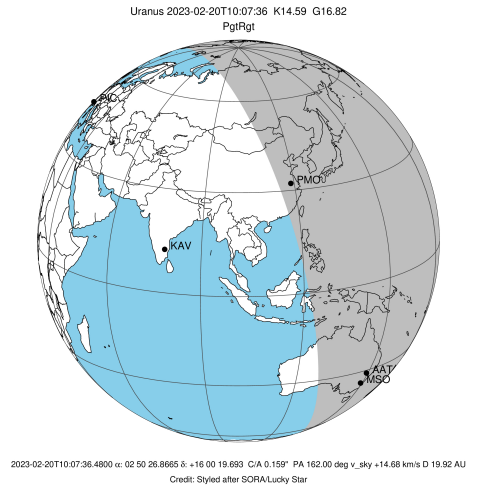
Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-02-20T09:19:30.789	73.34	6.41x	51311.76	-16.89		
lambda	I	2023-02-20T09:20:46.855	73.25	6.15x	50026.71	-16.89		
delta	I	2023-02-20T09:22:29.057	73.12	5.80x	48300.35	-16.89		
gamma	I	2023-02-20T09:23:08.678	73.06	5.67x	47631.15	-16.89		
eta	I	2023-02-20T09:23:35.621	73.03	5.58x	47176.12	-16.89		
beta	I	2023-02-20T09:25:05.985	72.90	5.27x	45651.86	-16.89		
alpha	I	2023-02-20T09:26:00.163	72.82	5.09x	44734.65	-16.88		
4	I	2023-02-20T09:28:11.599	72.61	4.64x	42525.93	-16.88		
5	I	2023-02-20T09:28:23.491	72.60	4.60x	42311.89	-16.88		
6	I	2023-02-20T09:28:53.691	72.55	4.50x	41795.95	-16.87		
Uranus	I	2023-02-20T09:41:01.961	71.20	2.01x	25212.17		-30.47	-31.64
Uranus	E	2023-02-20T10:39:05.754	61.78	-10.09	25157.73		33.12	34.34
6	E	2023-02-20T10:50:42.140	59.56	-12.54	41876.28	16.95		
5	E	2023-02-20T10:50:58.240	59.51	-12.60	42155.44	16.95		
4	E	2023-02-20T10:51:24.747	59.42	-12.69	42615.97	16.96		
alpha	E	2023-02-20T10:53:28.713	59.02	-13.13	44707.20	16.96		
beta	E	2023-02-20T10:54:25.233	58.84	-13.33	45667.58	16.97		
eta	E	2023-02-20T10:55:54.251	58.55	-13.64	47176.12	16.97		
gamma	E	2023-02-20T10:56:20.470	58.46	-13.73	47621.13	16.97		
delta	E	2023-02-20T10:57:00.483	58.33	-13.88	48300.35	16.98		
lambda	E	2023-02-20T10:58:42.158	58.00	-14.23	50026.71	16.98		
epsilon	E	2023-02-20T10:59:35.501	57.82	-14.42	50932.68	16.98		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-02-20T10:10:35.770
 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 : 33482813421031424
 2Mass ID (if available) : 02502685+1600195
 ICRS Star Coord at Epoch: 02h 50m 26.86647s +16:00:19.69250s
 RUWE (>1.4 is poor) : 1.09
 K magnitude : 14.591
 G magnitude : 16.821
 RP magnitude : 16.131
 BP magnitude : 17.354
 DUPflag : 0
 Distance (au) : 19.915
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 14.68
 Sun-Target sep (deg) : 73.79
 Sun-Moon sep (deg) : 72.54
 B (ring opening deg) : 56.61
 PA of pole (deg) : -93.42
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.204
 C/A sky separation (km) : 2939.7
 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_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	2023-02-20T09:20:44.841		31.27	-7.53	51359.13	-16.98		
lambda	I	2023-02-20T09:22:03.347		31.08	-7.80	50026.71	-16.97		
delta	I	2023-02-20T09:23:45.064		30.84	-8.14	48300.35	-16.97		
gamma	I	2023-02-20T09:24:24.480		30.74	-8.28	47631.39	-16.97		
eta	I	2023-02-20T09:24:51.305		30.67	-8.37	47176.12	-16.97		
beta	I	2023-02-20T09:26:21.078		30.46	-8.67	45654.57	-16.97		
alpha	I	2023-02-20T09:27:15.461		30.32	-8.85	44730.02	-16.97		
4	I	2023-02-20T09:29:25.957		30.00	-9.30	42526.47	-16.97		
5	I	2023-02-20T09:29:37.777		29.97	-9.34	42314.55	-16.97		
6	I	2023-02-20T09:30:07.847		29.90	-9.44	41798.08	-16.97		
Uranus	I	2023-02-20T09:41:39.036		28.15	-11.76	25159.49		-33.04	-34.25
Uranus	E	2023-02-20T10:39:30.402		18.38	-22.98	25204.26		30.87	32.04
6	E	2023-02-20T10:51:28.649		16.20	-25.18	41878.35	17.12		
5	E	2023-02-20T10:51:44.606		16.15	-25.23	42157.80	17.12		
4	E	2023-02-20T10:52:10.637		16.07	-25.31	42616.56	17.13		
alpha	E	2023-02-20T10:54:13.052		15.69	-25.68	44702.84	17.13		
beta	E	2023-02-20T10:55:09.375		15.52	-25.85	45670.12	17.14		
eta	E	2023-02-20T10:56:37.356		15.24	-26.11	47176.12	17.14		
gamma	E	2023-02-20T10:57:03.331		15.16	-26.19	47621.36	17.14		
delta	E	2023-02-20T10:57:42.938		15.04	-26.31	48300.35	17.14		
lambda	E	2023-02-20T10:59:23.614		14.73	-26.61	50026.71	17.15		
epsilon	E	2023-02-20T11:00:18.961		14.55	-26.77	50976.05	17.16		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-02-20T10:10:16.550
 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 : 33482813421031424
 2Mass ID (if available) : 02502685+1600195
 ICRS Star Coord at Epoch: 02h 50m 26.86647s +16:00:19.69250s
 RUWE (>1.4 is poor) : 1.09
 K magnitude : 14.591
 G magnitude : 16.821
 RP magnitude : 16.131
 BP magnitude : 17.354
 DUPflag : 0
 Distance (au) : 19.915
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 14.68
 Sun-Target sep (deg) : 73.79
 Sun-Moon sep (deg) : 72.49
 B (ring opening deg) : 56.61
 PA of pole (deg) : -93.42
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.220
 C/A sky separation (km) : 3182.2
 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	2023-02-20T09:20:30.363		28.29	-6.20	51360.81	-16.99		
lambda	I	2023-02-20T09:21:48.913		28.12	-6.45	50026.71	-16.98		
delta	I	2023-02-20T09:23:30.562		27.89	-6.78	48300.35	-16.98		
gamma	I	2023-02-20T09:24:09.951		27.80	-6.91	47631.40	-16.98		
eta	I	2023-02-20T09:24:36.759		27.74	-6.99	47176.12	-16.98		
beta	I	2023-02-20T09:26:06.470		27.54	-7.28	45654.67	-16.98		
alpha	I	2023-02-20T09:27:00.840		27.41	-7.46	44729.84	-16.98		
4	I	2023-02-20T09:29:11.250		27.12	-7.88	42526.51	-16.98		
5	I	2023-02-20T09:29:23.068		27.09	-7.92	42314.61	-16.98		
6	I	2023-02-20T09:29:53.119		27.02	-8.01	41798.18	-16.97		
Uranus	I	2023-02-20T09:41:23.452		25.40	-10.22	25158.47		-33.08	-34.30
Uranus	E	2023-02-20T10:39:08.016		16.27	-20.83	25206.91		30.73	31.91
6	E	2023-02-20T10:51:07.885		14.20	-22.90	41878.42	17.12		
5	E	2023-02-20T10:51:23.843		14.15	-22.95	42157.93	17.12		
4	E	2023-02-20T10:51:49.858		14.08	-23.02	42616.57	17.13		
alpha	E	2023-02-20T10:53:52.234		13.72	-23.37	44702.68	17.13		
beta	E	2023-02-20T10:54:48.557		13.56	-23.53	45670.22	17.14		
eta	E	2023-02-20T10:56:16.509		13.30	-23.78	47176.12	17.14		
gamma	E	2023-02-20T10:56:42.477		13.22	-23.85	47621.37	17.15		
delta	E	2023-02-20T10:57:22.073		13.11	-23.96	48300.35	17.15		
lambda	E	2023-02-20T10:59:02.721		12.81	-24.25	50026.71	17.16		
epsilon	E	2023-02-20T10:59:58.156		12.65	-24.40	50977.83	17.17		