

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-12-27T14:13:19.240
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 57080665119958528
 2Mass ID (if available) : 03415715+1927085

ICRS Star Coord at Epoch: 03h 41m 57.14838s +19:27:08.39604s

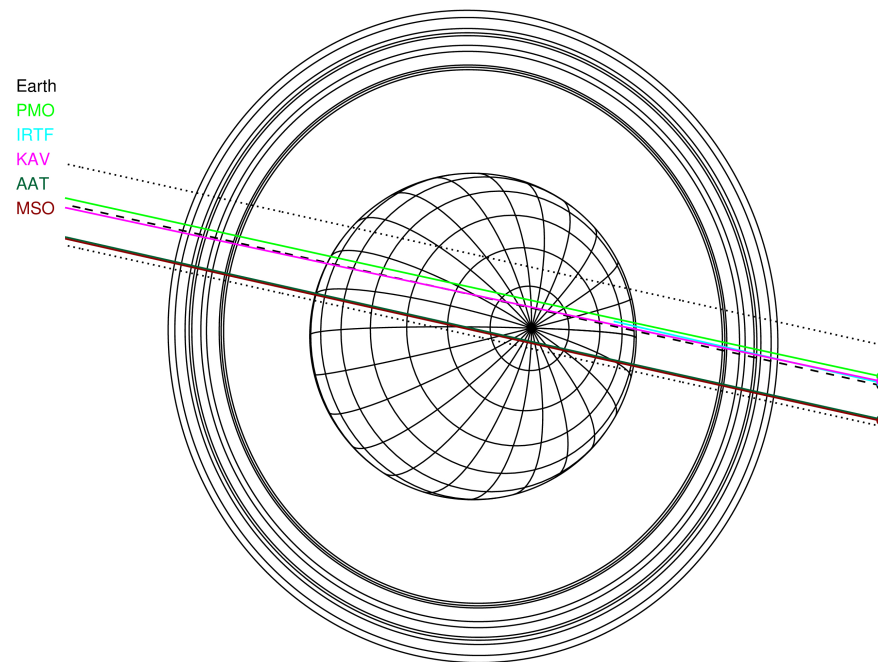
RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.152
 G magnitude : 18.166
 RP magnitude : 16.915
 BP magnitude : 19.897
 DUPflag : 0
 Distance (au) : 18.707
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.12
 Sun-Target sep (deg) : 141.99
 Sun-Moon sep (deg) : 54.62
 B (ring opening deg) : 68.75
 PA of pole (deg) : -81.82

#	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



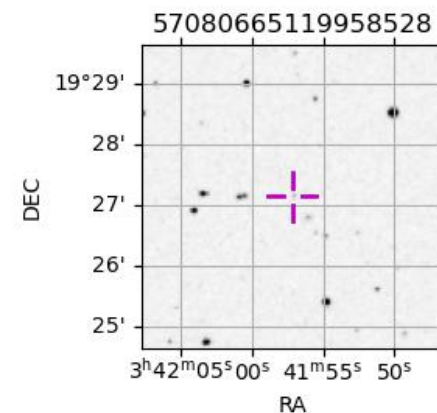
2025-12-27T14:13:19.2400 ex: 03 41 57.1484 s: +19 27 08.396 C/A 0.4711 PA 167.49 deg v_sky -17.12 km/s D 18.71 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2025-12-27T14:13:19 K14.15 G18.17 PgtRgt

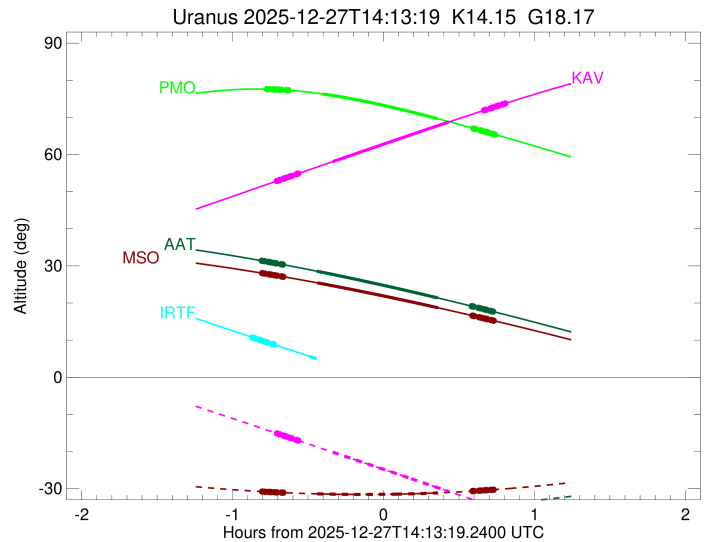
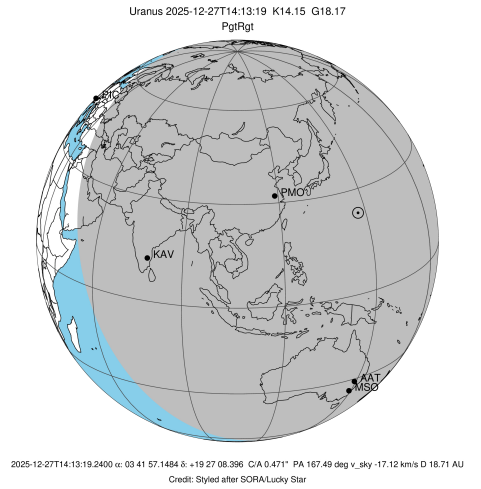


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++	+ +	+++++	DEC 27 13:27 - DEC 27 14:57	PieRie
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	+++++	+		DEC 27 13:21 - DEC 27 13:43	PinRin
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	DEC 27 13:31 - DEC 27 15:01	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	+++++	+ +	+++++	DEC 27 13:25 - DEC 27 14:57	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+ +	+++++	DEC 27 13:25 - DEC 27 14:57	PieRie

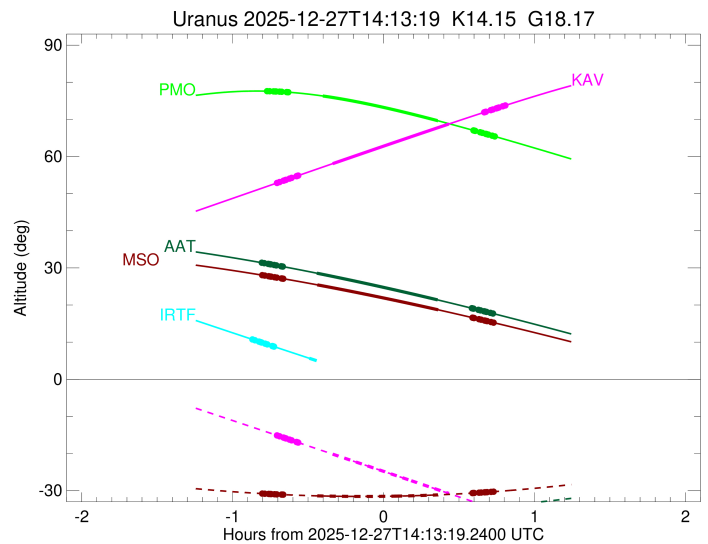
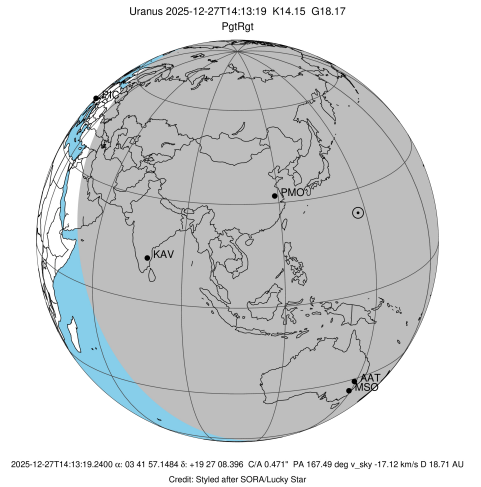


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-12-27T14:11:57.480
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 57080665119958528
 2Mass ID (if available) : 03415715+1927085
 ICRS Star Coord at Epoch: 03h 41m 57.14838s +19:27:08.39604s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.152
 G magnitude : 18.166
 RP magnitude : 16.915
 BP magnitude : 19.897
 DUPflag : 0
 Distance (au) : 18.707
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.12
 Sun-Target sep (deg) : 141.99
 Sun-Moon sep (deg) : 55.50
 B (ring opening deg) : 68.75
 PA of pole (deg) : -81.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.551
 C/A sky separation (km) : 7471.4
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



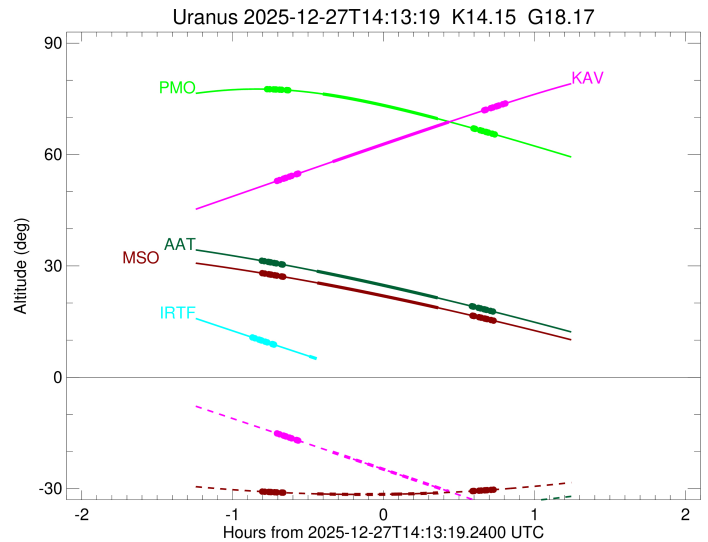
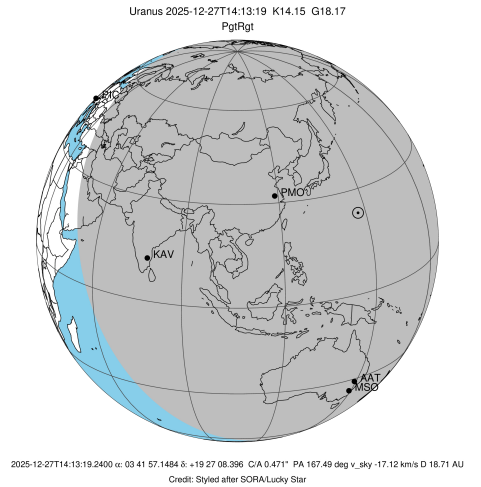
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2025-12-27T13:27:22.138		77.60	-54.05	50801.19	-18.43		
lambda	I	2025-12-27T13:28:04.153		77.59	-54.19	50026.71	-18.43		
delta	I	2025-12-27T13:29:37.866		77.55	-54.52	48300.35	-18.41		
gamma	I	2025-12-27T13:30:14.727		77.54	-54.65	47621.74	-18.41		
eta	I	2025-12-27T13:30:38.940		77.52	-54.74	47176.12	-18.40		
beta	I	2025-12-27T13:32:01.928		77.48	-55.03	45649.92	-18.38		
alpha	I	2025-12-27T13:32:54.269		77.44	-55.22	44691.63	-18.37		
4	I	2025-12-27T13:34:51.562		77.36	-55.63	42526.87	-18.34		
5	I	2025-12-27T13:35:06.368		77.35	-55.68	42247.13	-18.34		
6	I	2025-12-27T13:35:27.448		77.33	-55.76	41871.99	-18.33		
Uranus	I	2025-12-27T13:49:12.082		76.31	-58.66	25052.24		21.22	22.13
Uranus	E	2025-12-27T14:34:54.796		69.65	-68.13	25237.70		-16.65	-17.40
6	E	2025-12-27T14:49:03.317		67.05	-70.96	41796.04	18.29		
5	E	2025-12-27T14:49:28.417		66.97	-71.04	42251.55	18.30		
4	E	2025-12-27T14:49:47.903		66.91	-71.10	42616.02	18.30		
alpha	E	2025-12-27T14:51:43.197		66.54	-71.48	44736.90	18.33		
beta	E	2025-12-27T14:52:34.106		66.38	-71.65	45666.25	18.34		
eta	E	2025-12-27T14:53:56.368		66.12	-71.91	47176.12	18.36		
gamma	E	2025-12-27T14:54:21.070		66.04	-71.99	47629.69	18.36		
delta	E	2025-12-27T14:54:57.585		65.92	-72.11	48300.35	18.37		
lambda	E	2025-12-27T14:56:31.526		65.62	-72.41	50026.71	18.38		
epsilon	E	2025-12-27T14:57:47.166		65.37	-72.65	51417.71	18.38		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-12-27T14:07:06.880
 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 : 57080665119958528
 2Mass ID (if available) : 03415715+1927085
 ICRS Star Coord at Epoch: 03h 41m 57.14838s +19:27:08.39604s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.152
 G magnitude : 18.166
 RP magnitude : 16.915
 BP magnitude : 19.897
 DUPflag : 0
 Distance (au) : 18.707
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.12
 Sun-Target sep (deg) : 141.99
 Sun-Moon sep (deg) : 55.15
 B (ring opening deg) : 68.75
 PA of pole (deg) : -81.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.536
 C/A sky separation (km) : 7277.2
 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_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	2025-12-27T13:21:32.057		10.66	-48.50	50804.43	-18.09		
lambda	I	2025-12-27T13:22:15.030		10.50	-48.34	50026.71	-18.09		
delta	I	2025-12-27T13:23:50.490		10.14	-47.97	48300.35	-18.08		
gamma	I	2025-12-27T13:24:28.038		10.00	-47.83	47621.78	-18.07		
eta	I	2025-12-27T13:24:52.708		9.91	-47.73	47176.12	-18.06		
beta	I	2025-12-27T13:26:17.245		9.59	-47.41	45650.18	-18.04		
alpha	I	2025-12-27T13:27:10.577		9.39	-47.21	44691.96	-18.03		
4	I	2025-12-27T13:29:10.135		8.94	-46.75	42526.73	-18.00		
5	I	2025-12-27T13:29:25.285		8.88	-46.69	42245.85	-18.00		
6	I	2025-12-27T13:29:46.657		8.80	-46.61	41872.38	-17.98		
Uranus	I	2025-12-27T13:43:47.539		5.66	-43.41	25053.54		21.19	22.10
Uranus	E	2025-12-27T14:30:41.629		-4.69x	-32.74	25239.59		-16.60	-17.34
6	E	2025-12-27T14:45:11.998		-7.84x	-29.45	41795.97	17.82		
5	E	2025-12-27T14:45:37.789		-7.93x	-29.36	42252.05	17.83		
4	E	2025-12-27T14:45:57.765		-8.00x	-29.28	42615.97	17.83		
alpha	E	2025-12-27T14:47:56.142		-8.43x	-28.84	44736.71	17.85		
beta	E	2025-12-27T14:48:48.427		-8.61x	-28.64	45666.12	17.86		
eta	E	2025-12-27T14:50:12.924		-8.92x	-28.32	47176.12	17.87		
gamma	E	2025-12-27T14:50:38.296		-9.01x	-28.23	47629.66	17.88		
delta	E	2025-12-27T14:51:15.808		-9.14x	-28.08	48300.35	17.88		
lambda	E	2025-12-27T14:52:52.319		-9.49x	-27.72	50026.71	17.89		
epsilon	E	2025-12-27T14:54:09.916		-9.76x	-27.43	51415.48	17.89		

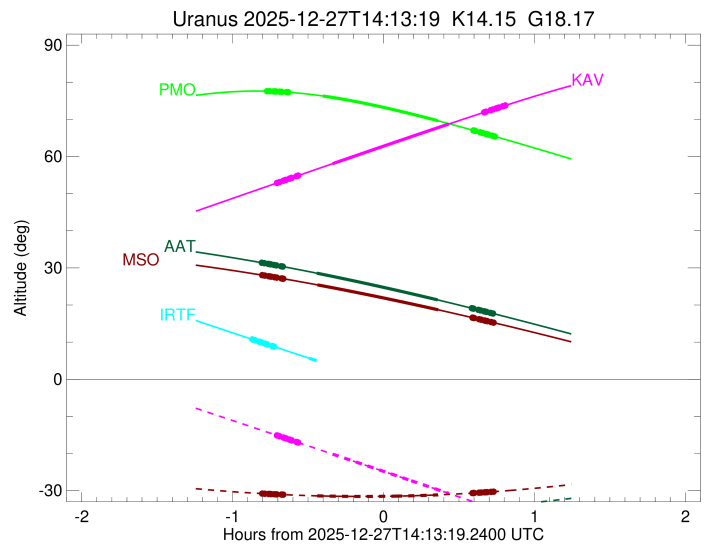
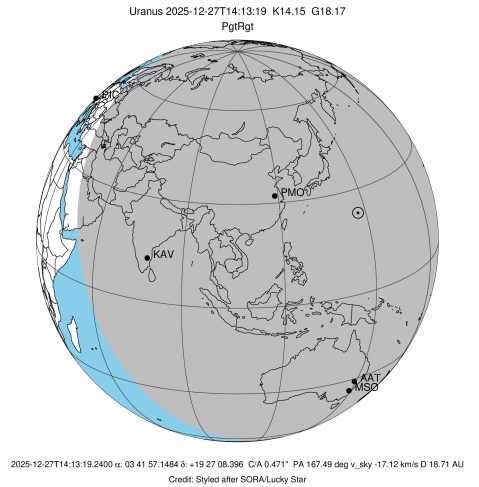
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-12-27T14:16:09.000
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 57080665119958528
 2Mass ID (if available) : 03415715+1927085
 ICRS Star Coord at Epoch: 03h 41m 57.14838s +19:27:08.39603s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.152
 G magnitude : 18.166
 RP magnitude : 16.915
 BP magnitude : 19.897
 DUPflag : 0
 Distance (au) : 18.707
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.12
 Sun-Target sep (deg) : 141.99
 Sun-Moon sep (deg) : 55.07
 B (ring opening deg) : 68.75
 PA of pole (deg) : -81.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.472
 C/A sky separation (km) : 6398.2
 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



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

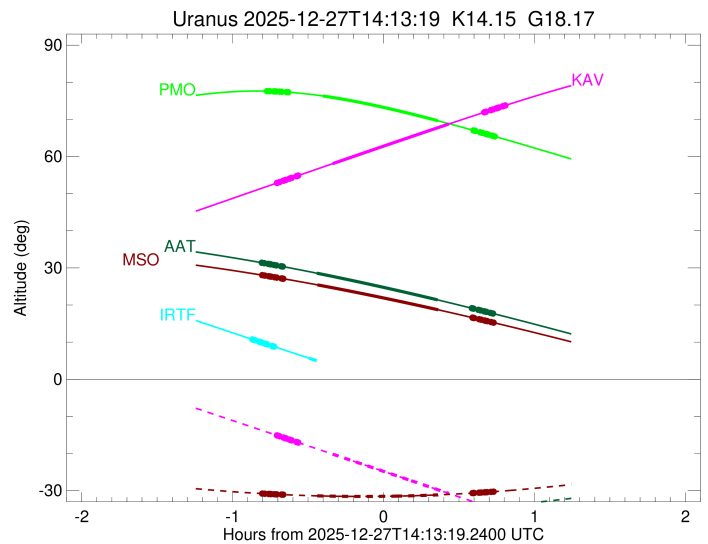
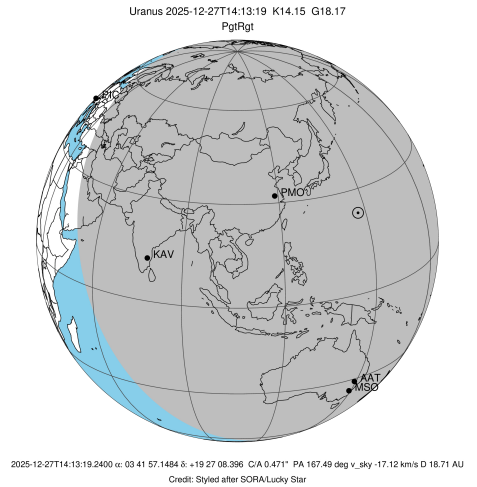
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2025-12-27T13:31:18.541		52.96	-15.20	50804.68	-18.43		
lambda	I	2025-12-27T13:32:00.745		53.13	-15.36	50026.71	-18.43		
delta	I	2025-12-27T13:33:34.435		53.49	-15.71	48300.35	-18.42		
gamma	I	2025-12-27T13:34:11.274		53.64	-15.85	47621.79	-18.42		
eta	I	2025-12-27T13:34:35.475		53.73	-15.95	47176.12	-18.41		
beta	I	2025-12-27T13:35:58.377		54.06	-16.26	45650.24	-18.40		
alpha	I	2025-12-27T13:36:50.658		54.26	-16.46	44692.04	-18.40		
4	I	2025-12-27T13:38:47.814		54.72	-16.90	42526.69	-18.37		
5	I	2025-12-27T13:39:02.672		54.78	-16.96	42245.45	-18.37		
6	I	2025-12-27T13:39:23.569		54.86	-17.04	41872.50	-18.37		
Uranus	I	2025-12-27T13:53:04.477		58.07	-20.16	25055.10		21.15	22.06
Uranus	E	2025-12-27T14:39:21.488		68.78	-30.77	25213.80		-17.29	-18.06
6	E	2025-12-27T14:53:18.615		71.91	-33.97	41796.39	18.42		
5	E	2025-12-27T14:53:43.418		72.00	-34.07	42249.07	18.43		
4	E	2025-12-27T14:54:02.904		72.07	-34.14	42616.22	18.43		
alpha	E	2025-12-27T14:55:57.418		72.49	-34.58	44737.75	18.46		
beta	E	2025-12-27T14:56:47.968		72.68	-34.77	45666.82	18.47		
eta	E	2025-12-27T14:58:09.657		72.98	-35.08	47176.12	18.48		
gamma	E	2025-12-27T14:58:34.205		73.07	-35.18	47629.80	18.48		
delta	E	2025-12-27T14:59:10.477		73.20	-35.32	48300.35	18.49		
lambda	E	2025-12-27T15:00:43.817		73.54	-35.67	50026.71	18.50		
epsilon	E	2025-12-27T15:01:59.418		73.81	-35.96	51425.82	18.50		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-12-27T14:10:45.830
 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 : 57080665119958528
 2Mass ID (if available) : 03415715+1927085
 ICRS Star Coord at Epoch: 03h 41m 57.14838s +19:27:08.39604s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.152
 G magnitude : 18.166
 RP magnitude : 16.915
 BP magnitude : 19.897
 DUPflag : 0
 Distance (au) : 18.707
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.12
 Sun-Target sep (deg) : 141.99
 Sun-Moon sep (deg) : 55.20
 B (ring opening deg) : 68.75
 PA of pole (deg) : -81.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.089
 C/A sky separation (km) : 1208.0
 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	2025-12-27T13:25:14.362		31.36	-34.77	50830.71	-18.59		
lambda	I	2025-12-27T13:25:57.605		31.27	-34.80	50026.71	-18.59		
delta	I	2025-12-27T13:27:30.467		31.08	-34.86	48300.35	-18.59		
gamma	I	2025-12-27T13:28:06.951		31.01	-34.88	47622.16	-18.59		
eta	I	2025-12-27T13:28:30.947		30.96	-34.90	47176.12	-18.59		
beta	I	2025-12-27T13:29:52.928		30.79	-34.95	45652.41	-18.59		
alpha	I	2025-12-27T13:30:44.668		30.68	-34.98	44694.92	-18.59		
4	I	2025-12-27T13:32:40.828		30.43	-35.05	42525.99	-18.58		
5	I	2025-12-27T13:32:56.056		30.40	-35.06	42234.77	-18.57		
6	I	2025-12-27T13:33:15.838		30.36	-35.07	41875.37	-18.58		
Uranus	I	2025-12-27T13:46:48.890		28.58	-35.42	25097.91		20.17	21.04
Uranus	E	2025-12-27T14:34:47.136		21.39	-35.13	25129.87		-19.41	-20.25
6	E	2025-12-27T14:48:24.173		19.14	-34.61	41798.01	18.47		
5	E	2025-12-27T14:48:48.467		19.08	-34.59	42239.94	18.47		
4	E	2025-12-27T14:49:08.409		19.02	-34.58	42616.56	18.47		
alpha	E	2025-12-27T14:51:02.847		18.70	-34.49	44740.64	18.47		
beta	E	2025-12-27T14:51:53.319		18.56	-34.45	45668.82	18.47		
eta	E	2025-12-27T14:53:14.920		18.33	-34.38	47176.12	18.47		
gamma	E	2025-12-27T14:53:39.504		18.26	-34.36	47630.19	18.47		
delta	E	2025-12-27T14:54:15.788		18.15	-34.33	48300.35	18.47		
lambda	E	2025-12-27T14:55:49.264		17.89	-34.25	50026.71	18.47		
epsilon	E	2025-12-27T14:57:06.454		17.67	-34.18	51452.17	18.46		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-12-27T14:10:58.970
 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 : 57080665119958528
 2Mass ID (if available) : 03415715+1927085
 ICRS Star Coord at Epoch: 03h 41m 57.14838s +19:27:08.39604s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.152
 G magnitude : 18.166
 RP magnitude : 16.915
 BP magnitude : 19.897
 DUPflag : 0
 Distance (au) : 18.707
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.12
 Sun-Target sep (deg) : 141.99
 Sun-Moon sep (deg) : 55.14
 B (ring opening deg) : 68.75
 PA of pole (deg) : -81.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.071
 C/A sky separation (km) : 958.3
 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	2025-12-27T13:25:24.169		28.01	-30.81	50831.95	-18.58		
lambda	I	2025-12-27T13:26:07.513		27.93	-30.83	50026.71	-18.58		
delta	I	2025-12-27T13:27:40.448		27.76	-30.89	48300.35	-18.57		
gamma	I	2025-12-27T13:28:16.960		27.69	-30.91	47622.18	-18.57		
eta	I	2025-12-27T13:28:40.975		27.64	-30.93	47176.12	-18.57		
beta	I	2025-12-27T13:30:03.014		27.48	-30.97	45652.51	-18.57		
alpha	I	2025-12-27T13:30:54.792		27.38	-31.00	44695.06	-18.57		
4	I	2025-12-27T13:32:51.049		27.16	-31.06	42525.98	-18.56		
5	I	2025-12-27T13:33:06.314		27.13	-31.07	42234.29	-18.56		
6	I	2025-12-27T13:33:26.071		27.09	-31.08	41875.49	-18.56		
Uranus	I	2025-12-27T13:47:00.044		25.43	-31.41	25100.84		20.10	20.97
Uranus	E	2025-12-27T14:35:01.797		18.72	-31.14	25126.25		-19.49	-20.34
6	E	2025-12-27T14:48:38.717		16.60	-30.67	41798.11	18.46		
5	E	2025-12-27T14:49:03.000		16.54	-30.65	42239.45	18.46		
4	E	2025-12-27T14:49:22.979		16.49	-30.64	42616.57	18.46		
alpha	E	2025-12-27T14:51:17.483		16.18	-30.55	44740.79	18.46		
beta	E	2025-12-27T14:52:07.980		16.05	-30.52	45668.92	18.46		
eta	E	2025-12-27T14:53:29.621		15.83	-30.46	47176.12	18.46		
gamma	E	2025-12-27T14:53:54.219		15.77	-30.44	47630.20	18.46		
delta	E	2025-12-27T14:54:30.522		15.67	-30.41	48300.35	18.46		
lambda	E	2025-12-27T14:56:04.050		15.42	-30.34	50026.71	18.46		
epsilon	E	2025-12-27T14:57:21.356		15.21	-30.27	51453.52	18.45		