

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2024-12-22T12:05:54.930  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 55984696840044288  
 2Mass ID (if available) : 03245445+1824346

Uranus 2024-12-22T12:05:54 K14.76 G18.00 PgtRgt

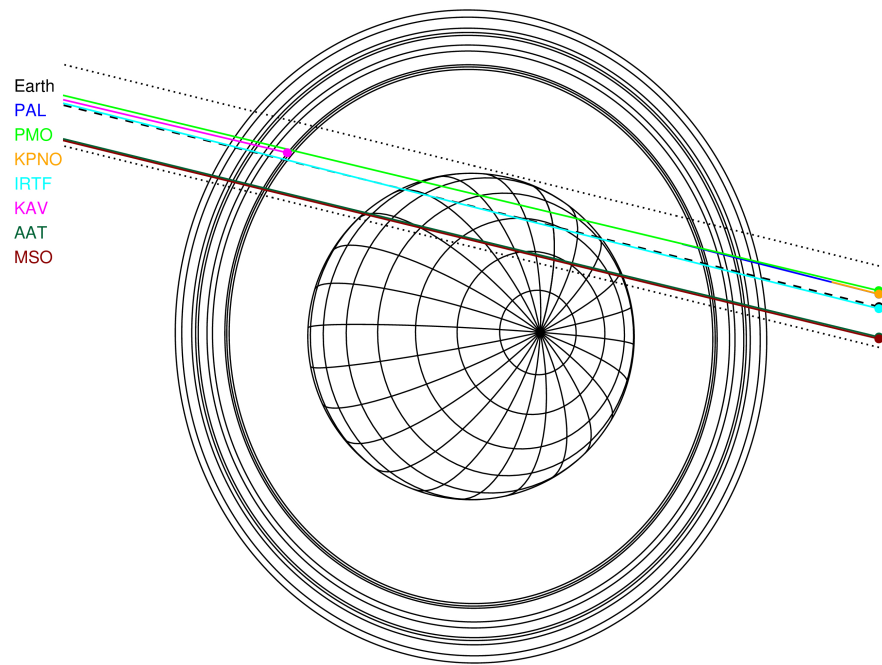
ICRS Star Coord at Epoch: 03h 24m 54.46649s +18:24:34.08718s

RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.760  
 G magnitude : 17.997  
 RP magnitude : 16.943  
 BP magnitude : 19.157  
 DUPflag : 0  
 Distance (au) : 18.763  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.37  
 Sun-Target sep (deg) : 142.75  
 Sun-Moon sep (deg) : 122.63  
 B (ring opening deg) : 64.84  
 PA of pole (deg) : -86.58

#	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

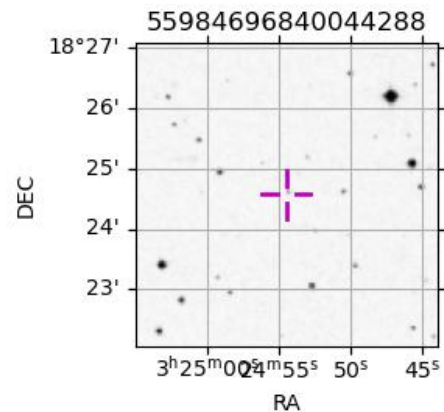


2024-12-22T12:05:54.9300 ex: 03 24 54.4665 s: +18 24 34.087 C/A 1.462 PA 166.12 deg v\_sky -17.37 km/s D 18.76 AU  
 Credit: Styled after SORA/Lucky Star

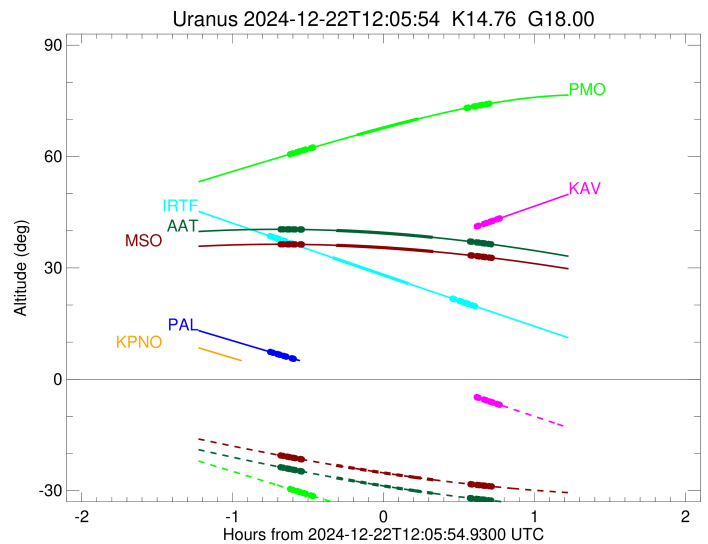
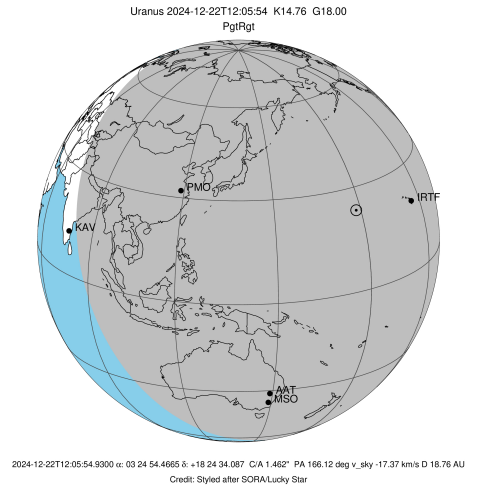


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 22 11:20 - DEC 22 11:30	PnnRin
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	DEC 22 11:28 - DEC 22 12:48	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 22 11:20 - DEC 22 12:42	PieRie
KAV	Kavalur Observatory	12.6	78.8			+++++	DEC 22 12:45 - DEC 22 12:52	PnnRne
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 22 11:24 - DEC 22 12:48	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+ +	+++++	DEC 22 11:24 - DEC 22 12:48	PieRie

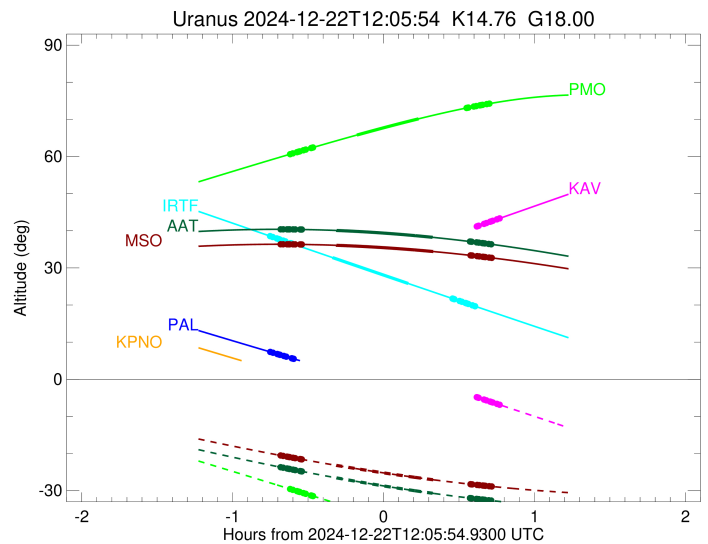
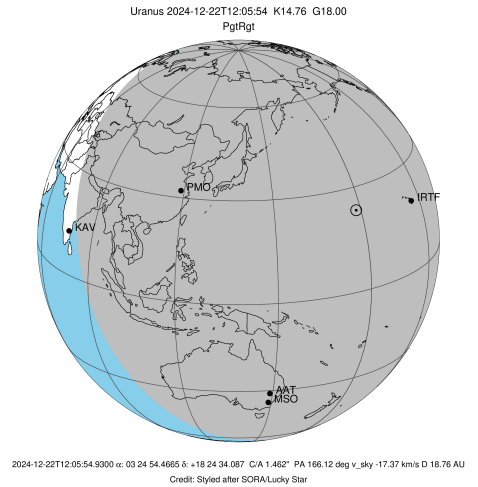


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2024-12-22T12:00:03.720  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 55984696840044288  
 2Mass ID (if available) : 032454445+1824346  
 ICRS Star Coord at Epoch: 03h 24m 54.46649s +18:24:34.08718s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.760  
 G magnitude : 17.997  
 RP magnitude : 16.943  
 BP magnitude : 19.157  
 DUPflag : 0  
 Distance (au) : 18.763  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.37  
 Sun-Target sep (deg) : 142.75  
 Sun-Moon sep (deg) : 123.07  
 B (ring opening deg) : 64.84  
 PA of pole (deg) : -86.58  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.632  
 C/A sky separation (km) : 22207.0  
 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\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



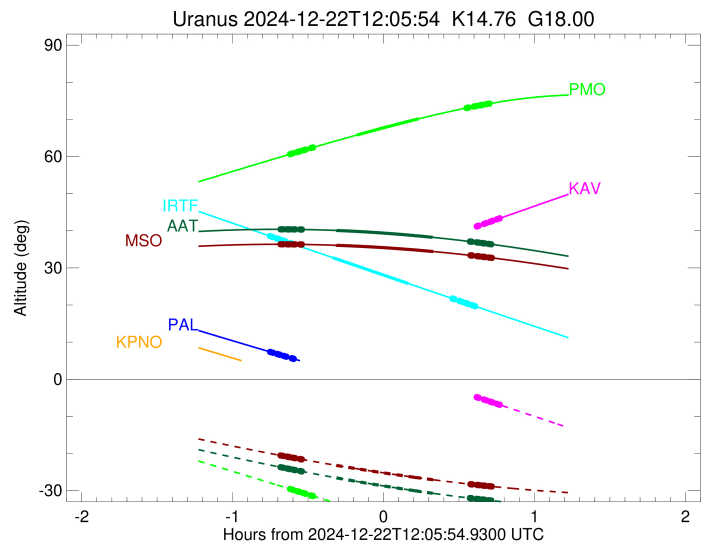
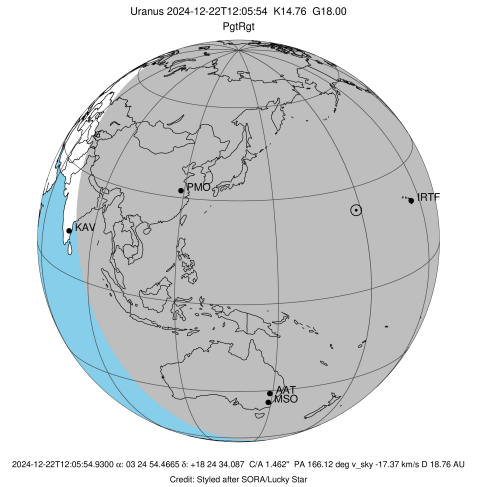
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2024-12-22T11:20:39.168		7.41	-42.33	51409.01	-17.19		
lambda	I	2024-12-22T11:22:00.066		7.14	-42.05	50026.71	-17.03		
delta	I	2024-12-22T11:23:41.918		6.80	-41.69	48300.35	-16.87		
gamma	I	2024-12-22T11:24:21.986		6.67	-41.55	47625.80	-16.80		
eta	I	2024-12-22T11:24:48.789		6.58	-41.46	47176.12	-16.75		
beta	I	2024-12-22T11:26:20.866		6.27	-41.14	45641.14	-16.58		
alpha	I	2024-12-22T11:27:17.637		6.08	-40.94	44707.43	-16.48		
4	I	2024-12-22T11:29:28.597		5.65	-40.49	42567.93	-16.17		
5	I	2024-12-22T11:29:53.745		5.57	-40.40	42164.64	-16.12		
6	I	2024-12-22T11:30:12.238		5.50	-40.33	41879.73	-16.08		
Uranus	I	2024-12-22T11:48:23.715		1.91x	-36.54	25304.42		17.93	18.72
Uranus	E	2024-12-22T12:12:12.393		-2.70x	-31.61	25538.30		-5.00	-5.24
6	E	2024-12-22T12:32:15.895		-6.50x	-27.48	41820.08	15.97		
5	E	2024-12-22T12:32:46.523		-6.59x	-27.37	42300.26	16.02		
4	E	2024-12-22T12:33:00.739		-6.63x	-27.32	42532.17	16.06		
alpha	E	2024-12-22T12:35:17.340		-7.06x	-26.86	44751.84	16.36		
beta	E	2024-12-22T12:36:13.334		-7.23x	-26.67	45669.91	16.46		
eta	E	2024-12-22T12:37:44.308		-7.51x	-26.36	47176.12	16.62		
gamma	E	2024-12-22T12:38:11.103		-7.60x	-26.26	47622.13	16.67		
delta	E	2024-12-22T12:38:51.714		-7.72x	-26.13	48300.35	16.73		
lambda	E	2024-12-22T12:40:34.414		-8.04x	-25.78	50026.71	16.88		
epsilon	E	2024-12-22T12:41:45.421		-8.26x	-25.53	51229.10	17.04		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2024-12-22T12:07:22.880  
 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 : 55984696840044288  
 2Mass ID (if available) : 032454445+1824346  
 ICRS Star Coord at Epoch: 03h 24m 54.46649s +18:24:34.08718s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.760  
 G magnitude : 17.997  
 RP magnitude : 16.943  
 BP magnitude : 19.157  
 DUPflag : 0  
 Distance (au) : 18.763  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.37  
 Sun-Target sep (deg) : 142.75  
 Sun-Moon sep (deg) : 123.22  
 B (ring opening deg) : 64.84  
 PA of pole (deg) : -86.58  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.603  
 C/A sky separation (km) : 21812.9  
 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



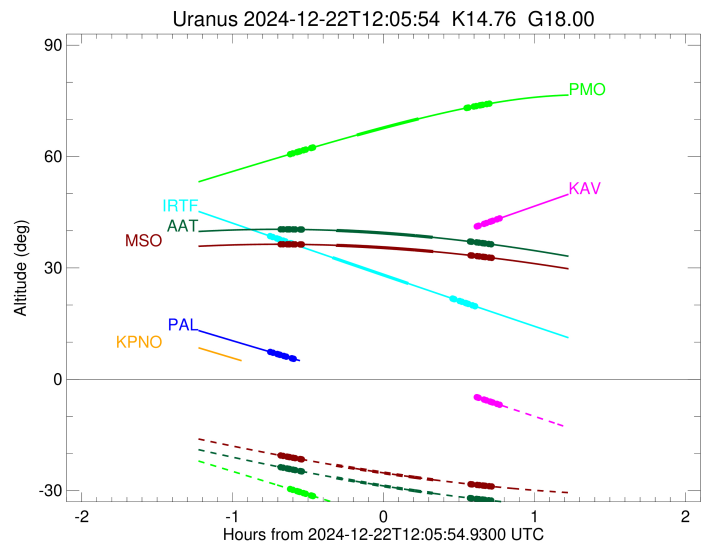
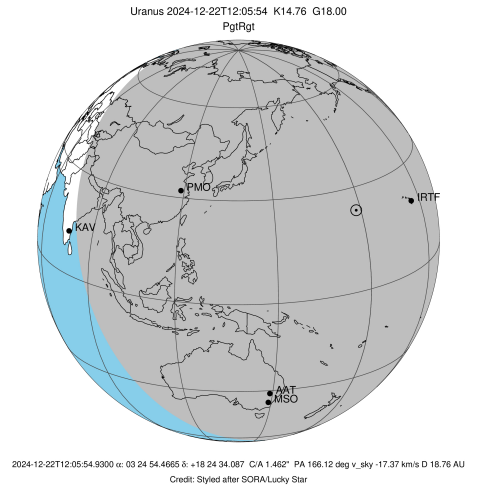
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2024-12-22T11:28:33.789		60.59	-29.51	51410.55	-17.59		
lambda	I	2024-12-22T11:29:52.936		60.85	-29.79	50026.71	-17.43		
delta	I	2024-12-22T11:31:32.415		61.18	-30.13	48300.35	-17.28		
gamma	I	2024-12-22T11:32:11.532		61.31	-30.27	47625.78	-17.21		
eta	I	2024-12-22T11:32:37.690		61.40	-30.36	47176.12	-17.17		
beta	I	2024-12-22T11:34:07.518		61.69	-30.67	45641.13	-17.00		
alpha	I	2024-12-22T11:35:02.863		61.88	-30.87	44707.53	-16.90		
4	I	2024-12-22T11:37:10.458		62.30	-31.31	42567.82	-16.60		
5	I	2024-12-22T11:37:34.928		62.38	-31.40	42164.73	-16.56		
6	I	2024-12-22T11:37:52.929		62.44	-31.46	41879.74	-16.52		
Uranus	I	2024-12-22T11:55:20.040		65.79	-35.12	25296.87		18.21	19.01
Uranus	E	2024-12-22T12:19:50.951		70.16	-40.29	25528.53		-6.07	-6.36
6	E	2024-12-22T12:38:54.427		73.08	-44.32	41819.10	16.55		
5	E	2024-12-22T12:39:24.145		73.15	-44.43	42301.42	16.59		
4	E	2024-12-22T12:39:37.833		73.18	-44.48	42532.76	16.63		
alpha	E	2024-12-22T12:41:49.700		73.47	-44.94	44751.68	16.93		
beta	E	2024-12-22T12:42:43.837		73.59	-45.13	45670.34	17.03		
eta	E	2024-12-22T12:44:11.723		73.78	-45.44	47176.12	17.20		
gamma	E	2024-12-22T12:44:37.626		73.84	-45.54	47622.21	17.24		
delta	E	2024-12-22T12:45:16.876		73.92	-45.67	48300.35	17.31		
lambda	E	2024-12-22T12:46:56.163		74.12	-46.02	50026.71	17.46		
epsilon	E	2024-12-22T12:48:04.308		74.26	-46.27	51220.05	17.62		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2024-12-22T12:00:29.810  
 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 : 55984696840044288  
 2Mass ID (if available) : 032454445+1824346  
 ICRS Star Coord at Epoch: 03h 24m 54.46649s +18:24:34.08718s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.760  
 G magnitude : 17.997  
 RP magnitude : 16.943  
 BP magnitude : 19.157  
 DUPflag : 0  
 Distance (au) : 18.763  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.37  
 Sun-Target sep (deg) : 142.75  
 Sun-Moon sep (deg) : 123.43  
 B (ring opening deg) : 64.84  
 PA of pole (deg) : -86.58  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.452  
 C/A sky separation (km) : 19753.7  
 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\_itrff93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



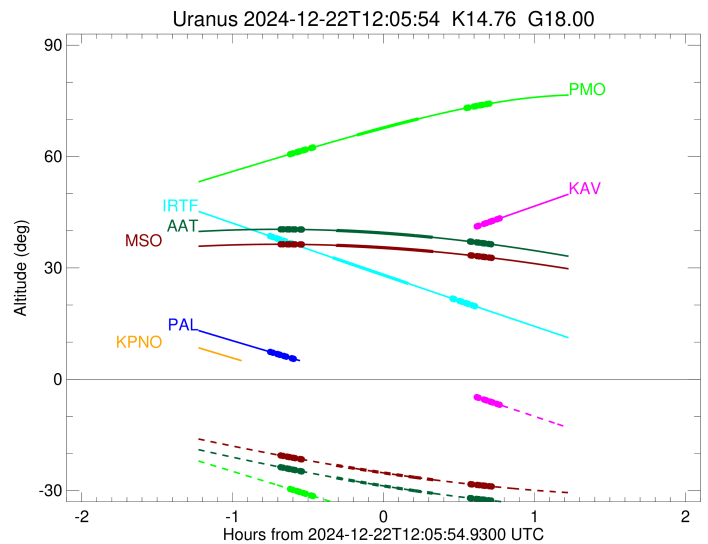
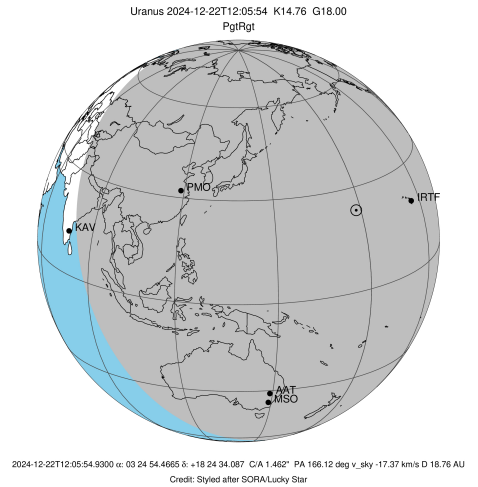
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2024-12-22T11:20:36.845		38.61	-75.59	51393.29	-17.88		
lambda	I	2024-12-22T11:21:53.673		38.31	-75.30	50026.71	-17.74		
delta	I	2024-12-22T11:23:31.316		37.93	-74.93	48300.35	-17.62		
gamma	I	2024-12-22T11:24:09.647		37.79	-74.79	47626.09	-17.56		
eta	I	2024-12-22T11:24:35.294		37.69	-74.69	47176.12	-17.53		
beta	I	2024-12-22T11:26:03.185		37.34	-74.36	45641.28	-17.39		
alpha	I	2024-12-22T11:26:57.378		37.13	-74.16	44705.55	-17.31		
4	I	2024-12-22T11:29:01.429		36.65	-73.69	42570.81	-17.07		
5	I	2024-12-22T11:29:25.518		36.56	-73.60	42162.32	-17.04		
6	I	2024-12-22T11:29:42.931		36.49	-73.54	41879.58	-17.00		
Uranus	I	2024-12-22T11:45:38.549		32.78	-69.92	25226.88		20.63	21.52
Uranus	E	2024-12-22T12:15:46.561		25.79	-63.03	25492.25		-9.02	-9.44
6	E	2024-12-22T12:33:19.219		21.74	-59.01	41817.34	16.89		
5	E	2024-12-22T12:33:48.611		21.63	-58.90	42303.40	16.92		
4	E	2024-12-22T12:34:01.989		21.58	-58.85	42533.87	16.95		
alpha	E	2024-12-22T12:36:11.565		21.08	-58.35	44751.35	17.19		
beta	E	2024-12-22T12:37:05.018		20.88	-58.15	45671.05	17.26		
eta	E	2024-12-22T12:38:31.803		20.55	-57.82	47176.12	17.39		
gamma	E	2024-12-22T12:38:57.437		20.45	-57.72	47622.34	17.42		
delta	E	2024-12-22T12:39:36.291		20.30	-57.57	48300.35	17.48		
lambda	E	2024-12-22T12:41:14.742		19.92	-57.20	50026.71	17.59		
epsilon	E	2024-12-22T12:42:21.675		19.66	-56.94	51206.76	17.73		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2024-12-22T12:11:00.210  
 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 : 55984696840044288  
 2Mass ID (if available) : 032454445+1824346  
 ICRS Star Coord at Epoch: 03h 24m 54.46649s +18:24:34.08718s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.760  
 G magnitude : 17.997  
 RP magnitude : 16.943  
 BP magnitude : 19.157  
 DUPflag : 0  
 Distance (au) : 18.763  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.37  
 Sun-Target sep (deg) : 142.75  
 Sun-Moon sep (deg) : 122.64  
 B (ring opening deg) : 64.84  
 PA of pole (deg) : -86.58  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.572  
 C/A sky separation (km) : 21387.6  
 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



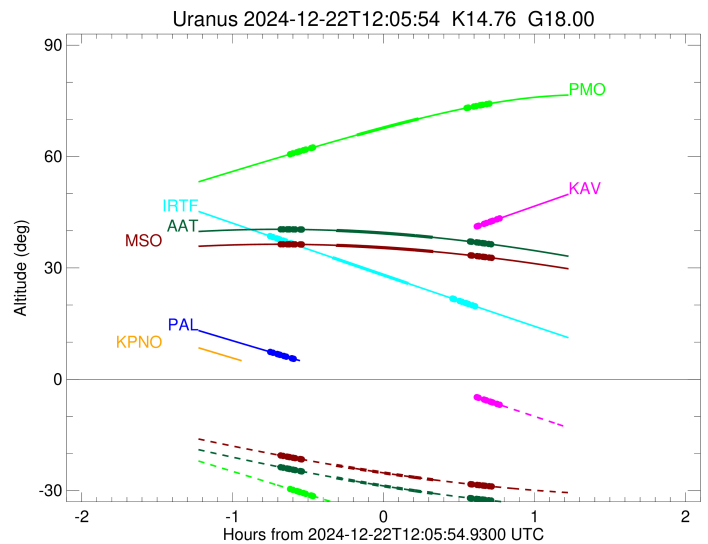
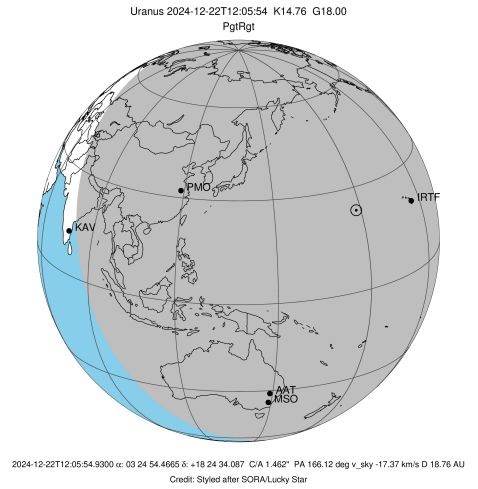
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2024-12-22T11:31:36.135		24.23	10.97x	51408.28	-17.47		
lambda	I	2024-12-22T11:32:55.659		24.55	10.68x	50026.71	-17.32		
delta	I	2024-12-22T11:34:35.733		24.94	10.32x	48300.35	-17.18		
gamma	I	2024-12-22T11:35:15.066		25.10	10.18x	47625.82	-17.12		
eta	I	2024-12-22T11:35:41.368		25.20	10.08x	47176.12	-17.08		
beta	I	2024-12-22T11:37:11.649		25.56	9.75x	45641.15	-16.92		
alpha	I	2024-12-22T11:38:07.266		25.78	9.55x	44707.24	-16.83		
4	I	2024-12-22T11:40:15.312		26.28	9.09x	42568.26	-16.55		
5	I	2024-12-22T11:40:39.909		26.38	9.00x	42164.35	-16.51		
6	I	2024-12-22T11:40:57.952		26.45	8.93x	41879.73	-16.47		
Uranus	I	2024-12-22T11:58:12.427		30.54	5.15x	25283.16		18.70	19.52
Uranus	E	2024-12-22T12:24:12.116		36.71	-0.62x	25520.08		-6.87	-7.19
6	E	2024-12-22T12:42:58.040		41.17	-4.82x	41818.53	16.56		
5	E	2024-12-22T12:43:27.824		41.29	-4.93x	42302.07	16.60		
4	E	2024-12-22T12:43:41.487		41.34	-4.98x	42533.11	16.64		
alpha	E	2024-12-22T12:45:53.306		41.86	-5.47	44751.57	16.93		
beta	E	2024-12-22T12:46:47.486		42.08	-5.68	45670.58	17.03		
eta	E	2024-12-22T12:48:15.416		42.43	-6.01	47176.12	17.18		
gamma	E	2024-12-22T12:48:41.345		42.53	-6.10	47622.25	17.23		
delta	E	2024-12-22T12:49:20.633		42.68	-6.25	48300.35	17.29		
lambda	E	2024-12-22T12:51:00.044		43.08	-6.63	50026.71	17.44		
epsilon	E	2024-12-22T12:52:08.013		43.35	-6.88	51215.17	17.59		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2024-12-22T12:06:08.520  
 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 : 55984696840044288  
 2Mass ID (if available) : 032454445+1824346  
 ICRS Star Coord at Epoch: 03h 24m 54.46649s +18:24:34.08718s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.760  
 G magnitude : 17.997  
 RP magnitude : 16.943  
 BP magnitude : 19.157  
 DUPflag : 0  
 Distance (au) : 18.763  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.37  
 Sun-Target sep (deg) : 142.75  
 Sun-Moon sep (deg) : 123.09  
 B (ring opening deg) : 64.84  
 PA of pole (deg) : -86.58  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.097  
 C/A sky separation (km) : 14932.9  
 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	2024-12-22T11:24:51.211		40.39	-23.67	51361.93	-18.66		
lambda	I	2024-12-22T11:26:03.017		40.39	-23.83	50026.71	-18.57		
delta	I	2024-12-22T11:27:36.148		40.39	-24.04	48300.35	-18.50		
gamma	I	2024-12-22T11:28:12.588		40.39	-24.12	47626.63	-18.47		
eta	I	2024-12-22T11:28:36.988		40.38	-24.18	47176.12	-18.45		
beta	I	2024-12-22T11:30:00.278		40.37	-24.36	45641.71	-18.38		
alpha	I	2024-12-22T11:30:51.695		40.37	-24.48	44702.16	-18.34		
4	I	2024-12-22T11:32:47.891		40.35	-24.73	42576.15	-18.20		
5	I	2024-12-22T11:33:10.902		40.35	-24.78	42158.80	-18.19		
6	I	2024-12-22T11:33:27.117		40.34	-24.82	41878.82	-18.17		
Uranus	I	2024-12-22T11:47:10.613		40.08	-26.56	25131.47		23.64	24.63
Uranus	E	2024-12-22T12:25:24.491		38.24	-30.71	25383.35		-14.78	-15.45
6	E	2024-12-22T12:40:15.319		37.11	-32.01	41812.44	18.15		
5	E	2024-12-22T12:40:43.344		37.07	-32.05	42308.40	18.16		
4	E	2024-12-22T12:40:55.762		37.05	-32.06	42537.60	18.17		
alpha	E	2024-12-22T12:42:56.732		36.88	-32.22	44750.03	18.31		
beta	E	2024-12-22T12:43:47.185		36.81	-32.29	45673.12	18.35		
eta	E	2024-12-22T12:45:08.868		36.69	-32.40	47176.12	18.42		
gamma	E	2024-12-22T12:45:33.104		36.65	-32.43	47622.79	18.44		
delta	E	2024-12-22T12:46:09.820		36.60	-32.47	48300.35	18.47		
lambda	E	2024-12-22T12:47:43.129		36.46	-32.59	50026.71	18.53		
epsilon	E	2024-12-22T12:48:44.361		36.36	-32.67	51162.84	18.62		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2024-12-22T12:06:14.810  
 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 : 55984696840044288  
 2Mass ID (if available) : 032454445+1824346  
 ICRS Star Coord at Epoch: 03h 24m 54.46649s +18:24:34.08718s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.760  
 G magnitude : 17.997  
 RP magnitude : 16.943  
 BP magnitude : 19.157  
 DUPflag : 0  
 Distance (au) : 18.763  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.37  
 Sun-Target sep (deg) : 142.75  
 Sun-Moon sep (deg) : 123.04  
 B (ring opening deg) : 64.84  
 PA of pole (deg) : -86.58  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.078  
 C/A sky separation (km) : 14673.8  
 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	2024-12-22T11:24:50.304		36.36	-20.50	51360.03	-18.67		
lambda	I	2024-12-22T11:26:01.960		36.36	-20.65	50026.71	-18.58		
delta	I	2024-12-22T11:27:35.019		36.36	-20.85	48300.35	-18.52		
gamma	I	2024-12-22T11:28:11.427		36.36	-20.93	47626.67	-18.49		
eta	I	2024-12-22T11:28:35.806		36.35	-20.98	47176.12	-18.47		
beta	I	2024-12-22T11:29:59.010		36.35	-21.15	45641.74	-18.40		
alpha	I	2024-12-22T11:30:50.380		36.34	-21.26	44701.97	-18.36		
4	I	2024-12-22T11:32:46.394		36.32	-21.49	42576.46	-18.23		
5	I	2024-12-22T11:33:09.394		36.32	-21.54	42158.64	-18.21		
6	I	2024-12-22T11:33:25.582		36.32	-21.57	41878.76	-18.20		
Uranus	I	2024-12-22T11:47:05.385		36.09	-23.19	25127.77		23.75	24.74
Uranus	E	2024-12-22T12:25:42.024		34.41	-27.07	25377.65		-15.03	-15.70
6	E	2024-12-22T12:40:28.022		33.38	-28.27	41812.22	18.17		
5	E	2024-12-22T12:40:56.033		33.34	-28.30	42308.61	18.19		
4	E	2024-12-22T12:41:08.433		33.33	-28.32	42537.80	18.20		
alpha	E	2024-12-22T12:43:09.225		33.17	-28.46	44749.95	18.33		
beta	E	2024-12-22T12:43:59.630		33.11	-28.53	45673.21	18.37		
eta	E	2024-12-22T12:45:21.222		33.00	-28.62	47176.12	18.44		
gamma	E	2024-12-22T12:45:45.436		32.96	-28.65	47622.81	18.46		
delta	E	2024-12-22T12:46:22.119		32.91	-28.69	48300.35	18.48		
lambda	E	2024-12-22T12:47:55.352		32.79	-28.80	50026.71	18.55		
epsilon	E	2024-12-22T12:48:56.428		32.70	-28.87	51160.73	18.63		