

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-11-27T14:58:40.660
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3418328668039087872
 2Mass ID (if available) : 05013178+2247138

Uranus 2029-11-27T14:58:40 K14.76 G18.20 PgtRgt

ICRS Star Coord at Epoch: 05h 01m 31.79065s +22:47:13.45763s

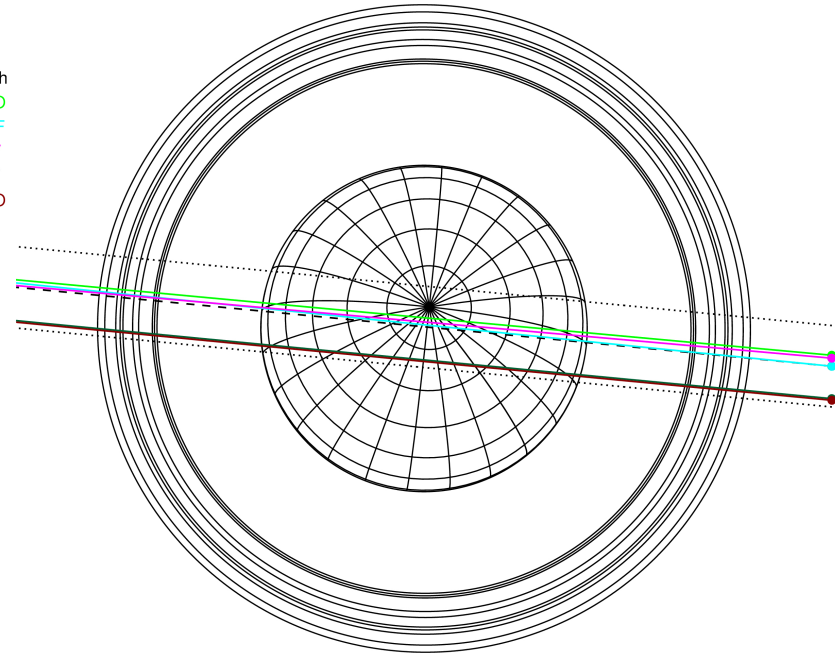
RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.755
 G magnitude : 18.196
 RP magnitude : 17.162
 BP magnitude : 19.342
 DUPflag : 0
 Distance (au) : 18.258
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.87
 Sun-Target sep (deg) : 168.69
 Sun-Moon sep (deg) : 61.94
 B (ring opening deg) : 82.17
 PA of pole (deg) : -13.80

#	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



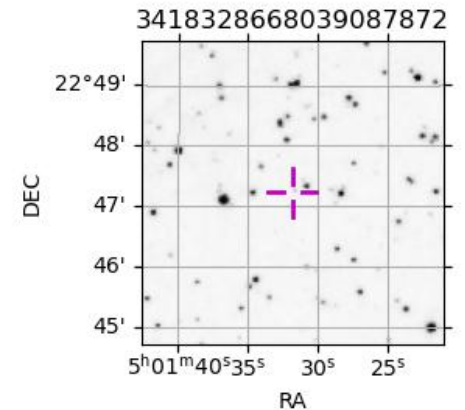
2029-11-27T14:58:40.6600 ra: 05 01 31.79065 ra: +22 47 13.458 C/A 0.026° PA 174.42 deg v_sky -22.87 km/s D 18.26 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PMO
 IRTF
 KAV
 AAT
 MSO

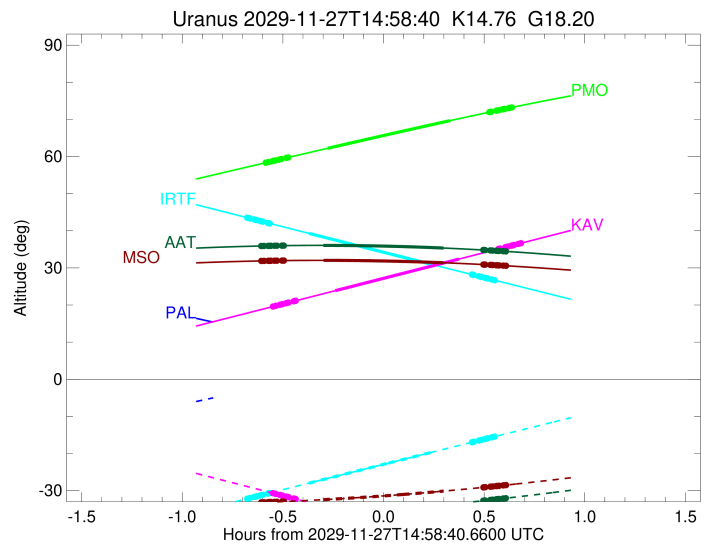
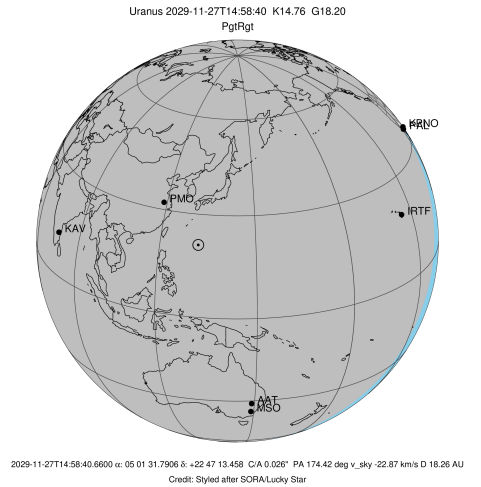


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	NOV 27 14:23 - NOV 27 15:36	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	+++++	+ +	+++++	NOV 27 14:17 - NOV 27 15:31	PieRie
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	NOV 27 14:25 - NOV 27 15:39	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	+++++	+ +	+++++	NOV 27 14:21 - NOV 27 15:34	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+ +	+++++	NOV 27 14:21 - NOV 27 15:34	PieRie

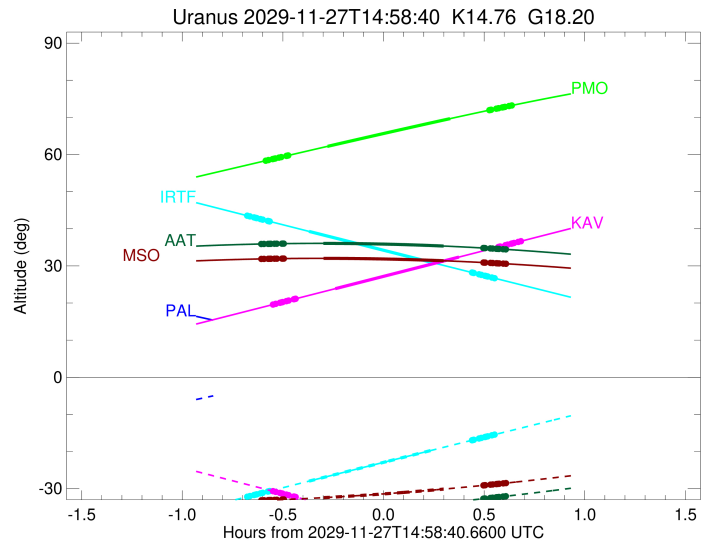
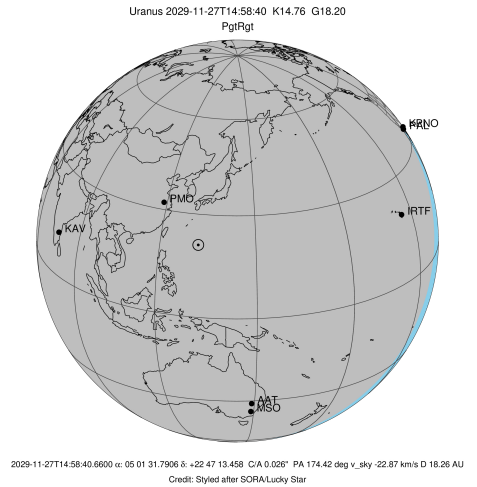


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-11-27T15:00:16.100
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3418328668039087872
 2Mass ID (if available) : 05013178+2247138
 ICRS Star Coord at Epoch: 05h 01m 31.79065s +22:47:13.45763s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.755
 G magnitude : 18.196
 RP magnitude : 17.162
 BP magnitude : 19.342
 DUPflag : 0
 Distance (au) : 18.258
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.87
 Sun-Target sep (deg) : 168.69
 Sun-Moon sep (deg) : 62.86
 B (ring opening deg) : 82.17
 PA of pole (deg) : -13.80
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.127
 C/A sky separation (km) : 1678.9
 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



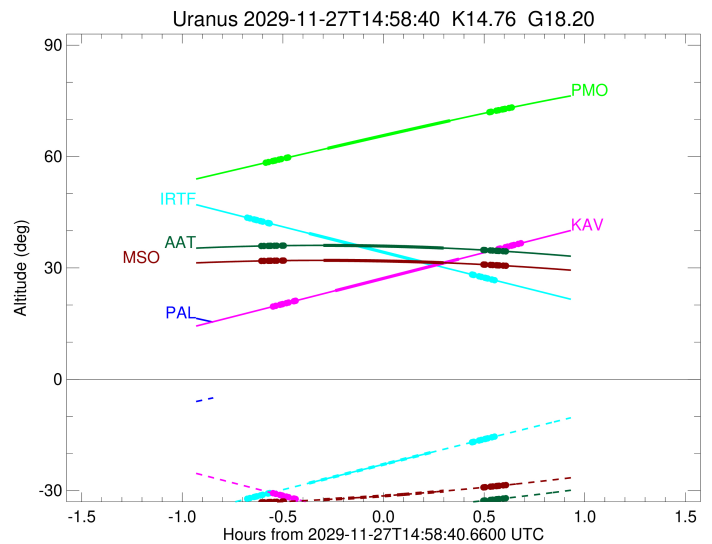
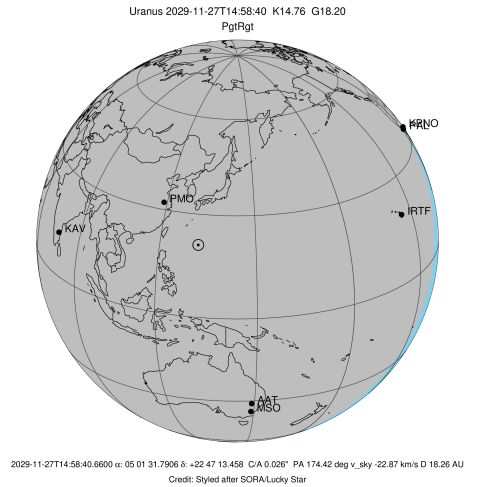
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-11-27T14:23:17.111		58.28	-67.46	51550.17	-23.17		
lambda	I	2029-11-27T14:24:22.854		58.51	-67.68	50026.71	-23.17		
delta	I	2029-11-27T14:25:37.353		58.77	-67.92	48300.35	-23.17		
gamma	I	2029-11-27T14:26:06.650		58.88	-68.01	47621.45	-23.17		
eta	I	2029-11-27T14:26:25.868		58.94	-68.08	47176.12	-23.17		
beta	I	2029-11-27T14:27:31.252		59.17	-68.29	45661.03	-23.17		
alpha	I	2029-11-27T14:28:12.483		59.32	-68.42	44705.56	-23.17		
4	I	2029-11-27T14:29:43.778		59.64	-68.71	42589.88	-23.17		
5	I	2029-11-27T14:29:56.812		59.68	-68.76	42289.09	-23.17		
6	I	2029-11-27T14:30:14.727		59.74	-68.81	41872.29	-23.17		
Uranus	I	2029-11-27T14:41:58.668		62.20	-71.02	25532.05		1.66	1.74
Uranus	E	2029-11-27T15:18:33.783		69.68	-76.94	25554.95		-0.64	-0.67
6	E	2029-11-27T15:30:12.775		71.95	-78.26	41800.29	23.22		
5	E	2029-11-27T15:30:28.914		72.00	-78.28	42176.11	23.22		
4	E	2029-11-27T15:30:45.012		72.05	-78.31	42549.21	23.22		
alpha	E	2029-11-27T15:32:19.070		72.35	-78.45	44733.85	23.23		
beta	E	2029-11-27T15:32:58.928		72.48	-78.50	45659.70	23.23		
eta	E	2029-11-27T15:34:04.209		72.68	-78.59	47176.12	23.23		
gamma	E	2029-11-27T15:34:23.786		72.74	-78.62	47630.91	23.23		
delta	E	2029-11-27T15:34:52.602		72.84	-78.66	48300.35	23.23		
lambda	E	2029-11-27T15:36:06.907		73.07	-78.75	50026.71	23.23		
epsilon	E	2029-11-27T15:36:38.196		73.17	-78.79	50753.68	23.24		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-11-27T14:54:52.680
 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 : 3418328668039087872
 2Mass ID (if available) : 05013178+2247138
 ICRS Star Coord at Epoch: 05h 01m 31.79065s +22:47:13.45763s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.755
 G magnitude : 18.196
 RP magnitude : 17.162
 BP magnitude : 19.342
 DUPflag : 0
 Distance (au) : 18.258
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.87
 Sun-Target sep (deg) : 168.69
 Sun-Moon sep (deg) : 62.04
 B (ring opening deg) : 82.17
 PA of pole (deg) : -13.80
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.043
 C/A sky separation (km) : 572.9
 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



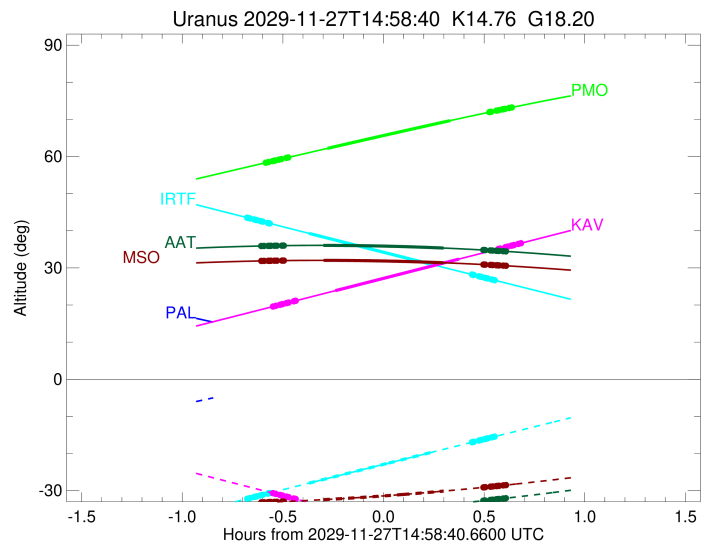
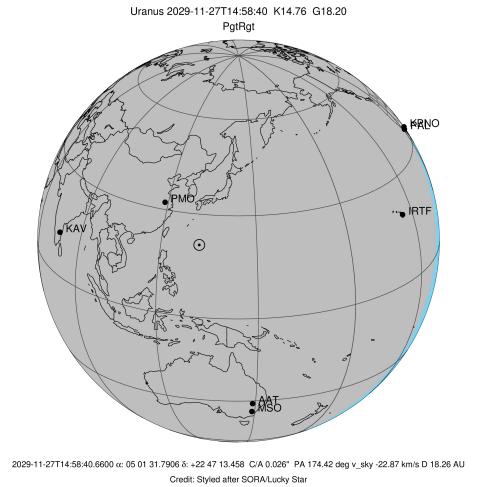
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-11-27T14:17:45.938		43.59	-32.25	51547.95	-23.16		
lambda	I	2029-11-27T14:18:51.626		43.34	-32.00	50026.71	-23.16		
delta	I	2029-11-27T14:20:06.177		43.05	-31.72	48300.35	-23.16		
gamma	I	2029-11-27T14:20:35.494		42.94	-31.60	47621.53	-23.15		
eta	I	2029-11-27T14:20:54.730		42.87	-31.53	47176.12	-23.15		
beta	I	2029-11-27T14:22:00.140		42.62	-31.28	45661.71	-23.15		
alpha	I	2029-11-27T14:22:41.484		42.46	-31.12	44704.49	-23.15		
4	I	2029-11-27T14:24:12.761		42.11	-30.78	42591.34	-23.15		
5	I	2029-11-27T14:24:25.773		42.06	-30.73	42291.19	-23.15		
6	I	2029-11-27T14:24:43.772		41.99	-30.66	41873.13	-23.15		
Uranus	I	2029-11-27T14:36:28.301		39.30	-27.98	25543.60		1.26	1.32
Uranus	E	2029-11-27T15:13:18.722		30.88	-19.61	25550.98		-0.91	-0.95
6	E	2029-11-27T15:25:02.177		28.22	-16.97	41800.66	23.05		
5	E	2029-11-27T15:25:18.452		28.16	-16.91	42177.04	23.05		
4	E	2029-11-27T15:25:34.661		28.10	-16.85	42549.88	23.05		
alpha	E	2029-11-27T15:27:09.371		27.74	-16.50	44733.38	23.05		
beta	E	2029-11-27T15:27:49.566		27.59	-16.34	45660.00	23.05		
eta	E	2029-11-27T15:28:55.339		27.34	-16.10	47176.12	23.05		
gamma	E	2029-11-27T15:29:15.071		27.26	-16.02	47630.94	23.05		
delta	E	2029-11-27T15:29:44.112		27.15	-15.92	48300.35	23.05		
lambda	E	2029-11-27T15:30:59.013		26.87	-15.64	50026.71	23.05		
epsilon	E	2029-11-27T15:31:30.508		26.75	-15.52	50752.60	23.05		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-11-27T15:02:44.710
 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 : 3418328668039087872
 2Mass ID (if available) : 05013178+2247138
 ICRS Star Coord at Epoch: 05h 01m 31.79065s +22:47:13.45763s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.755
 G magnitude : 18.196
 RP magnitude : 17.162
 BP magnitude : 19.342
 DUPflag : 0
 Distance (au) : 18.258
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.87
 Sun-Target sep (deg) : 168.69
 Sun-Moon sep (deg) : 62.71
 B (ring opening deg) : 82.17
 PA of pole (deg) : -13.80
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.077
 C/A sky separation (km) : 1021.8
 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



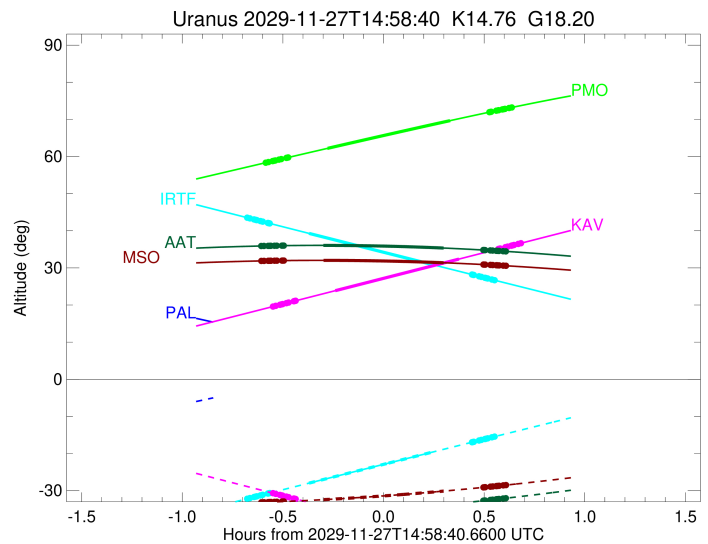
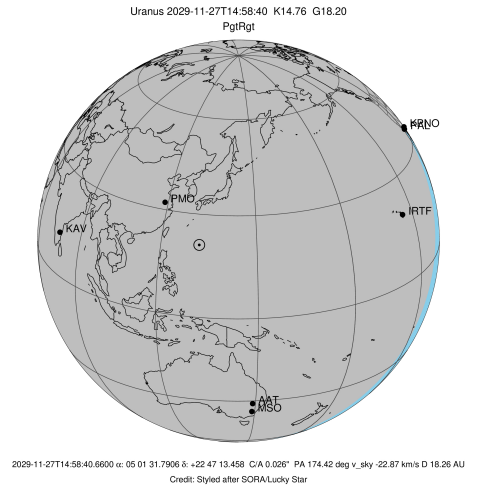
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-11-27T14:25:26.808		19.52	-30.62	51549.52	-22.98		
lambda	I	2029-11-27T14:26:33.086		19.78	-30.87	50026.71	-22.98		
delta	I	2029-11-27T14:27:48.217		20.07	-31.16	48300.35	-22.98		
gamma	I	2029-11-27T14:28:17.761		20.18	-31.28	47621.47	-22.98		
eta	I	2029-11-27T14:28:37.141		20.25	-31.35	47176.12	-22.98		
beta	I	2029-11-27T14:29:43.063		20.51	-31.61	45661.26	-22.98		
alpha	I	2029-11-27T14:30:24.662		20.67	-31.77	44705.19	-22.98		
4	I	2029-11-27T14:31:56.672		21.02	-32.13	42590.39	-22.98		
5	I	2029-11-27T14:32:09.799		21.07	-32.18	42289.83	-22.98		
6	I	2029-11-27T14:32:27.883		21.14	-32.25	41872.59	-22.98		
Uranus	I	2029-11-27T14:44:17.019		23.86	-35.00	25537.33		1.49	1.56
Uranus	E	2029-11-27T15:21:11.348		32.38	-43.60	25551.57		-0.87	-0.91
6	E	2029-11-27T15:32:54.180		35.09	-46.32	41800.71	23.10		
5	E	2029-11-27T15:33:10.426		35.15	-46.38	42177.17	23.10		
4	E	2029-11-27T15:33:26.604		35.21	-46.45	42549.98	23.10		
alpha	E	2029-11-27T15:35:01.108		35.58	-46.81	44733.29	23.10		
beta	E	2029-11-27T15:35:41.219		35.73	-46.97	45660.07	23.10		
eta	E	2029-11-27T15:36:46.831		35.98	-47.22	47176.12	23.11		
gamma	E	2029-11-27T15:37:06.514		36.06	-47.30	47630.95	23.11		
delta	E	2029-11-27T15:37:35.480		36.17	-47.41	48300.35	23.11		
lambda	E	2029-11-27T15:38:50.178		36.46	-47.70	50026.71	23.11		
epsilon	E	2029-11-27T15:39:21.567		36.58	-47.82	50752.24	23.11		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-11-27T14:58:41.870
 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 : 3418328668039087872
 2Mass ID (if available) : 05013178+2247138
 ICRS Star Coord at Epoch: 05h 01m 31.79065s +22:47:13.45763s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.755
 G magnitude : 18.196
 RP magnitude : 17.162
 BP magnitude : 19.342
 DUPflag : 0
 Distance (au) : 18.258
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.87
 Sun-Target sep (deg) : 168.69
 Sun-Moon sep (deg) : 62.41
 B (ring opening deg) : 82.17
 PA of pole (deg) : -13.80
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.370
 C/A sky separation (km) : 4897.3
 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_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	2029-11-27T14:21:57.380		35.89	-37.15	51538.11	-23.15		
lambda	I	2029-11-27T14:23:02.664		35.91	-37.11	50026.71	-23.15		
delta	I	2029-11-27T14:24:17.259		35.93	-37.07	48300.35	-23.14		
gamma	I	2029-11-27T14:24:46.585		35.94	-37.05	47621.82	-23.14		
eta	I	2029-11-27T14:25:05.851		35.95	-37.04	47176.12	-23.13		
beta	I	2029-11-27T14:26:11.230		35.96	-37.00	45664.01	-23.13		
alpha	I	2029-11-27T14:26:52.881		35.97	-36.97	44700.97	-23.12		
4	I	2029-11-27T14:28:23.954		35.99	-36.91	42596.20	-23.11		
5	I	2029-11-27T14:28:36.878		36.00	-36.90	42297.87	-23.10		
6	I	2029-11-27T14:28:55.141		36.00	-36.89	41875.71	-23.10		
Uranus	I	2029-11-27T14:40:43.785		36.06	-36.34	25557.68		-0.37	-0.38
Uranus	E	2029-11-27T15:16:37.147		35.35	-33.81	25493.65		-2.59	-2.71
6	E	2029-11-27T15:28:24.398		34.82	-32.72	41804.00	23.10		
5	E	2029-11-27T15:28:40.805		34.80	-32.69	42185.17	23.10		
4	E	2029-11-27T15:28:56.905		34.79	-32.66	42555.50	23.10		
alpha	E	2029-11-27T15:30:30.958		34.71	-32.51	44729.31	23.12		
beta	E	2029-11-27T15:31:11.320		34.67	-32.44	45662.56	23.12		
eta	E	2029-11-27T15:32:16.765		34.61	-32.33	47176.12	23.13		
gamma	E	2029-11-27T15:32:36.438		34.60	-32.30	47631.21	23.13		
delta	E	2029-11-27T15:33:05.359		34.57	-32.25	48300.35	23.14		
lambda	E	2029-11-27T15:34:19.956		34.50	-32.13	50026.71	23.15		
epsilon	E	2029-11-27T15:34:51.005		34.47	-32.07	50745.44	23.15		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-11-27T14:58:43.960
 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 : 3418328668039087872
 2Mass ID (if available) : 05013178+2247138
 ICRS Star Coord at Epoch: 05h 01m 31.79065s +22:47:13.45763s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.755
 G magnitude : 18.196
 RP magnitude : 17.162
 BP magnitude : 19.342
 DUPflag : 0
 Distance (au) : 18.258
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.87
 Sun-Target sep (deg) : 168.69
 Sun-Moon sep (deg) : 62.36
 B (ring opening deg) : 82.17
 PA of pole (deg) : -13.80
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.388
 C/A sky separation (km) : 5143.9
 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	2029-11-27T14:21:58.830		31.87	-33.17	51537.52	-23.12		
lambda	I	2029-11-27T14:23:04.172		31.89	-33.13	50026.71	-23.12		
delta	I	2029-11-27T14:24:18.863		31.91	-33.09	48300.35	-23.11		
gamma	I	2029-11-27T14:24:48.227		31.92	-33.08	47621.83	-23.10		
eta	I	2029-11-27T14:25:07.520		31.92	-33.07	47176.12	-23.10		
beta	I	2029-11-27T14:26:12.983		31.94	-33.03	45664.12	-23.09		
alpha	I	2029-11-27T14:26:54.704		31.95	-33.01	44700.81	-23.08		
4	I	2029-11-27T14:28:25.892		31.97	-32.95	42596.42	-23.07		
5	I	2029-11-27T14:28:38.829		31.97	-32.94	42298.17	-23.07		
6	I	2029-11-27T14:28:57.131		31.97	-32.93	41875.82	-23.06		
Uranus	I	2029-11-27T14:40:47.200		32.03	-32.43	25557.07		-0.44	-0.47
Uranus	E	2029-11-27T15:16:37.770		31.39	-30.13	25489.96		-2.66	-2.79
6	E	2029-11-27T15:28:26.523		30.90	-29.13	41804.16	23.06		
5	E	2029-11-27T15:28:42.962		30.89	-29.10	42185.54	23.07		
4	E	2029-11-27T15:28:59.081		30.88	-29.08	42555.75	23.07		
alpha	E	2029-11-27T15:30:33.250		30.80	-28.93	44729.13	23.08		
beta	E	2029-11-27T15:31:13.680		30.77	-28.87	45662.67	23.09		
eta	E	2029-11-27T15:32:19.209		30.72	-28.77	47176.12	23.10		
gamma	E	2029-11-27T15:32:38.908		30.70	-28.74	47631.22	23.10		
delta	E	2029-11-27T15:33:07.867		30.68	-28.70	48300.35	23.11		
lambda	E	2029-11-27T15:34:22.559		30.61	-28.58	50026.71	23.12		
epsilon	E	2029-11-27T15:34:53.639		30.59	-28.53	50745.26	23.12		