

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-25T22:24:24.060  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3425574041647362304  
 2Mass ID (if available) : 06153447+2339509

ICRS Star Coord at Epoch: 06h 15m 34.47555s +23:39:50.95284s

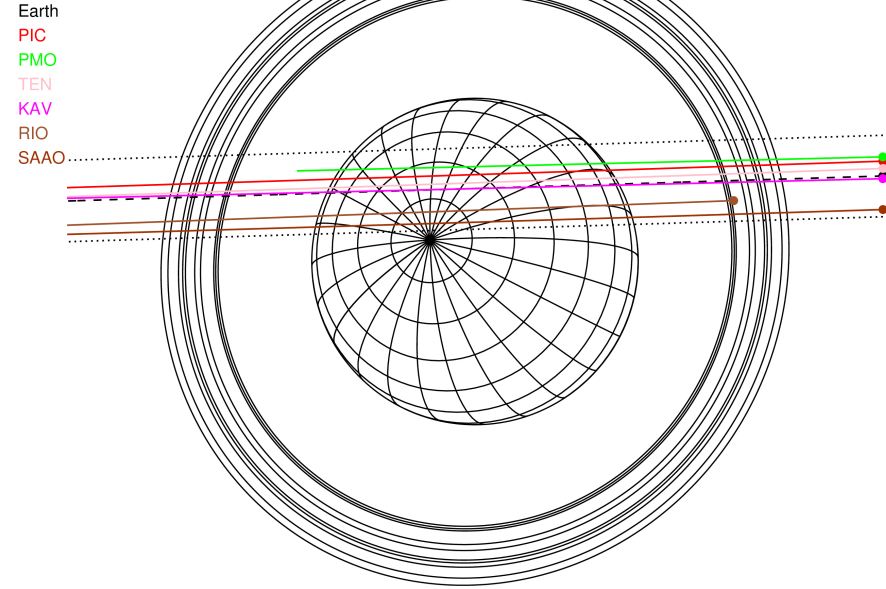
RUWE (>1.4 is poor) : 1.06  
 K magnitude : 10.557  
 G magnitude : 13.847  
 RP magnitude : 12.901  
 BP magnitude : 14.769  
 DUPflag : 0  
 Distance (au) : 17.970  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.41  
 Sun-Target sep (deg) : 179.51  
 Sun-Moon sep (deg) : 128.85  
 B (ring opening deg) : 72.23  
 PA of pole (deg) : 64.48

#	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



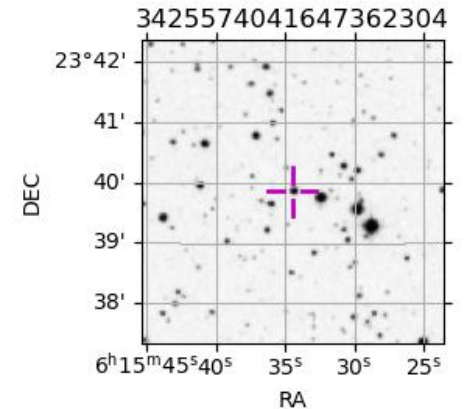
2033-12-25T22:24:24.0600 ra: 06 15 34.47556 cr: +23 39 50.953 C/A 0.884 PA 181.75 deg v\_sky -23.41 km/s D 17.97 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2033-12-25T22:24:24 K10.56 G13.85 PgtRgt

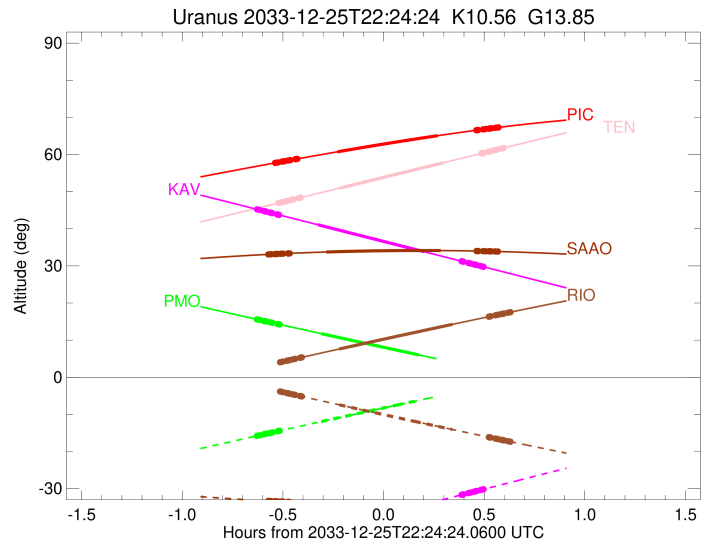
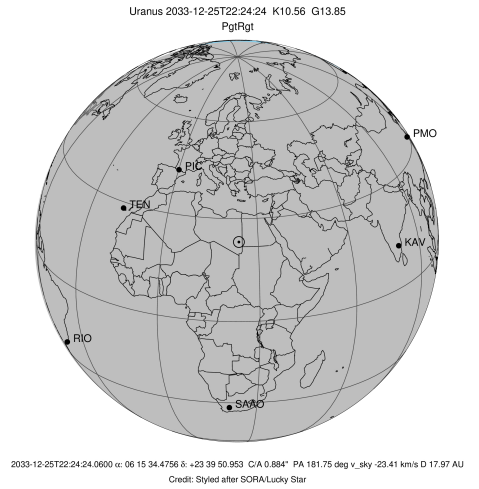


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	DEC 25 21:52 - DEC 25 22:58	PieRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +		DEC 25 21:46 - DEC 25 22:34	PieRin
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	+++++	+ +	+++++	DEC 25 21:53 - DEC 25 23:00	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	DEC 25 21:46 - DEC 25 22:54	PieRie
RIO	Rio de Janeiro	-22.9	316.8		+++	+ +	DEC 25 21:59 - DEC 25 23:02	PieRie
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	+++++	+ +	+++++	DEC 25 21:50 - DEC 25 22:58	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

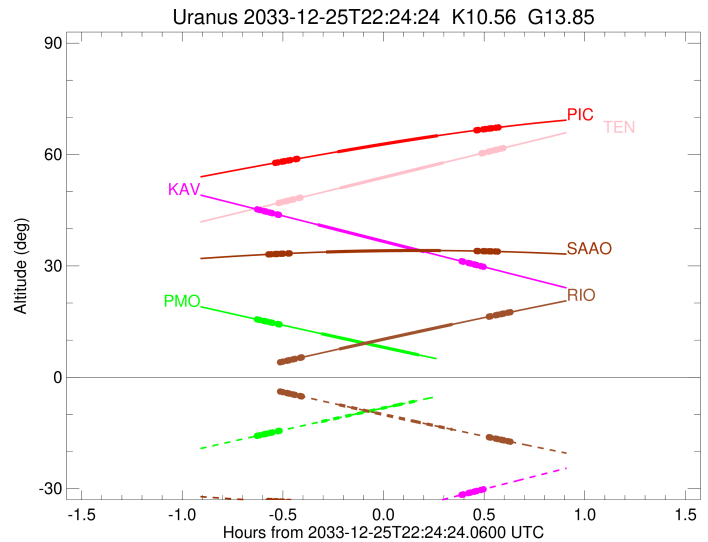
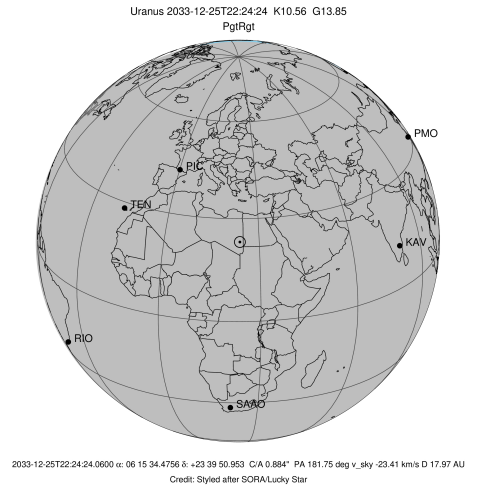


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-25T22:25:46.670  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 3425574041647362304  
 2Mass ID (if available) : 06153447+2339509  
 ICRS Star Coord at Epoch: 06h 15m 34.47555s +23:39:50.95284s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 10.557  
 G magnitude : 13.847  
 RP magnitude : 12.901  
 BP magnitude : 14.769  
 DUPflag : 0  
 Distance (au) : 17.970  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.41  
 Sun-Target sep (deg) : 179.51  
 Sun-Moon sep (deg) : 129.71  
 B (ring opening deg) : 72.23  
 PA of pole (deg) : 64.48  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.043  
 C/A sky separation (km) : 13595.9  
 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\_itrfr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



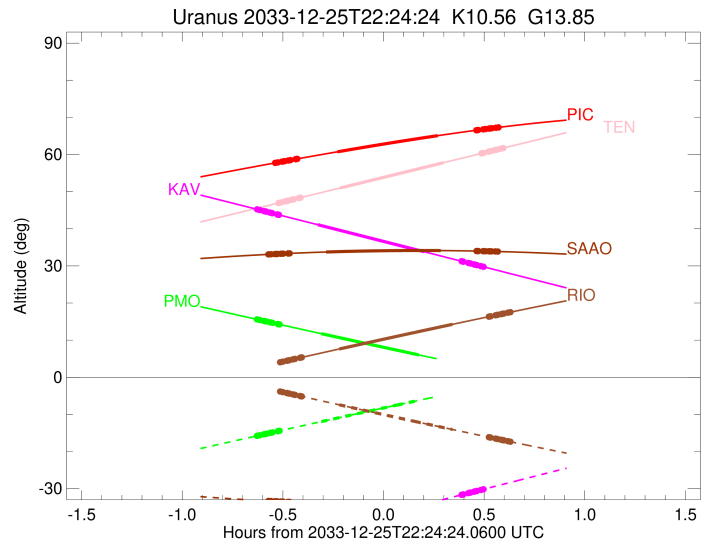
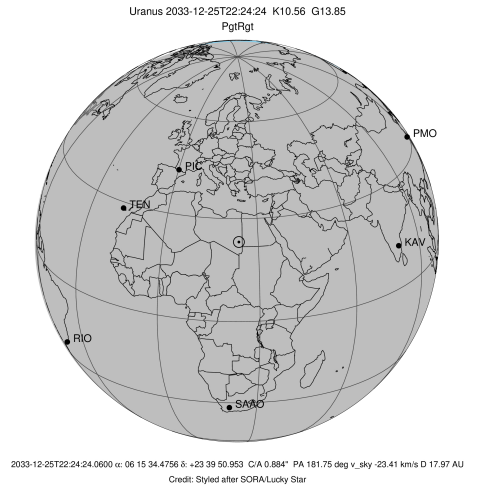
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-25T21:52:18.591		57.79	-57.32	50866.22	-23.68		
lambda	I	2033-12-25T21:52:54.004		57.88	-57.41	50026.71	-23.69		
delta	I	2033-12-25T21:54:06.983		58.08	-57.61	48300.35	-23.62		
gamma	I	2033-12-25T21:54:35.504		58.16	-57.69	47627.08	-23.59		
eta	I	2033-12-25T21:54:54.629		58.21	-57.74	47176.12	-23.57		
beta	I	2033-12-25T21:55:58.337		58.39	-57.92	45676.74	-23.50		
alpha	I	2033-12-25T21:56:39.652		58.50	-58.03	44706.05	-23.45		
4	I	2033-12-25T21:58:13.132		58.75	-58.28	42526.31	-23.32		
5	I	2033-12-25T21:58:22.722		58.78	-58.31	42291.55	-23.29		
6	I	2033-12-25T21:58:42.528		58.83	-58.36	41828.05	-23.27		
Uranus	I	2033-12-25T22:10:41.151		60.74	-60.27	25420.87		-8.85	-9.27
Uranus	E	2033-12-25T22:40:32.468		65.08	-64.61	25032.95		17.69	18.47
6	E	2033-12-25T22:52:07.307		66.54	-66.08	41870.21	23.30		
5	E	2033-12-25T22:52:19.476		66.57	-66.10	42155.42	23.32		
4	E	2033-12-25T22:52:37.913		66.61	-66.14	42603.16	23.35		
alpha	E	2033-12-25T22:54:09.621		66.79	-66.32	44747.10	23.48		
beta	E	2033-12-25T22:54:48.349		66.86	-66.40	45655.67	23.53		
eta	E	2033-12-25T22:55:52.830		66.99	-66.52	47176.12	23.61		
gamma	E	2033-12-25T22:56:11.740		67.02	-66.56	47622.68	23.63		
delta	E	2033-12-25T22:56:40.405		67.08	-66.62	48300.35	23.66		
lambda	E	2033-12-25T22:57:53.270		67.22	-66.76	50026.71	23.73		
epsilon	E	2033-12-25T22:58:44.136		67.31	-66.85	51234.81	23.72		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-25T22:20:34.190  
 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 : 3425574041647362304  
 2Mass ID (if available) : 06153447+2339509  
 ICRS Star Coord at Epoch: 06h 15m 34.47555s +23:39:50.95284s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 10.557  
 G magnitude : 13.847  
 RP magnitude : 12.901  
 BP magnitude : 14.769  
 DUPflag : 0  
 Distance (au) : 17.970  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.41  
 Sun-Target sep (deg) : 179.51  
 Sun-Moon sep (deg) : 128.49  
 B (ring opening deg) : 72.23  
 PA of pole (deg) : 64.48  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.140  
 C/A sky separation (km) : 14855.4  
 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\_itrfr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



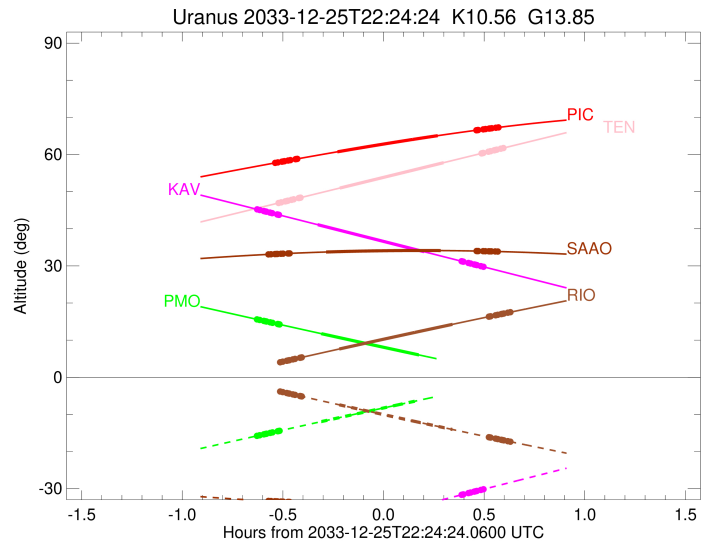
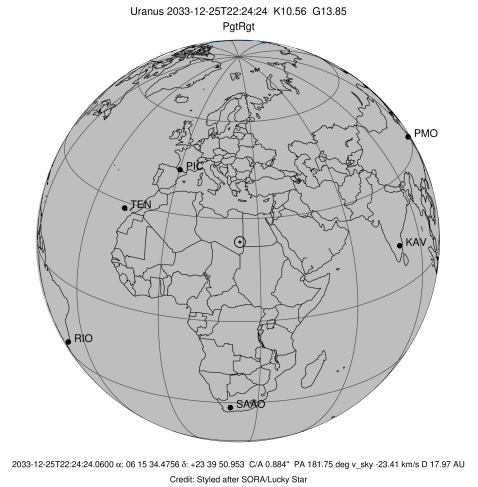
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-25T21:46:53.693		15.55	-15.74	50861.23	-23.24		
lambda	I	2033-12-25T21:47:29.572		15.43	-15.62	50026.71	-23.24		
delta	I	2033-12-25T21:48:43.992		15.18	-15.37	48300.35	-23.15		
gamma	I	2033-12-25T21:49:13.098		15.08	-15.27	47626.98	-23.12		
eta	I	2033-12-25T21:49:32.612		15.02	-15.21	47176.12	-23.09		
beta	I	2033-12-25T21:50:37.654		14.80	-14.99	45677.00	-23.00		
alpha	I	2033-12-25T21:51:19.848		14.66	-14.85	44706.72	-22.95		
4	I	2033-12-25T21:52:55.488		14.34	-14.53	42526.18	-22.78		
5	I	2033-12-25T21:53:05.376		14.30	-14.49	42290.20	-22.75		
6	I	2033-12-25T21:53:25.551		14.24	-14.43	41829.04	-22.73		
Uranus	I	2033-12-25T22:05:50.838		11.75	-11.94	25443.86		-8.07	-8.45
Uranus	E	2033-12-25T22:34:57.232		6.02	-6.21	25042.18		17.52	18.30
6	E	2033-12-25T22:46:59.415		3.70x	-3.89x	41871.26	22.64		
5	E	2033-12-25T22:47:11.887		3.66x	-3.85x	42155.10	22.66		
4	E	2033-12-25T22:47:30.820		3.60x	-3.79x	42601.87	22.69		
alpha	E	2033-12-25T22:49:05.205		3.30x	-3.49x	44747.76	22.85		
beta	E	2033-12-25T22:49:45.016		3.17x	-3.36x	45656.39	22.90		
eta	E	2033-12-25T22:50:51.218		2.96x	-3.15x	47176.12	22.99		
gamma	E	2033-12-25T22:51:10.629		2.90x	-3.09x	47622.54	23.01		
delta	E	2033-12-25T22:51:40.063		2.80x	-2.99x	48300.35	23.05		
lambda	E	2033-12-25T22:52:54.840		2.57x	-2.76x	50026.71	23.13		
epsilon	E	2033-12-25T22:53:46.441		2.40x	-2.59x	51221.42	23.12		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-25T22:27:00.010  
 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 : 3425574041647362304  
 2Mass ID (if available) : 06153447+2339509  
 ICRS Star Coord at Epoch: 06h 15m 34.47555s +23:39:50.95284s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 10.557  
 G magnitude : 13.847  
 RP magnitude : 12.901  
 BP magnitude : 14.769  
 DUPflag : 0  
 Distance (au) : 17.970  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.41  
 Sun-Target sep (deg) : 179.51  
 Sun-Moon sep (deg) : 129.81  
 B (ring opening deg) : 72.23  
 PA of pole (deg) : 64.48  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.945  
 C/A sky separation (km) : 12313.8  
 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



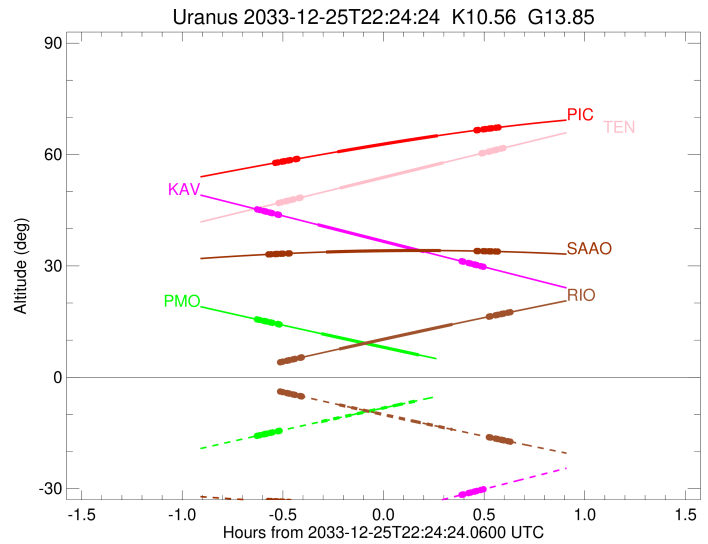
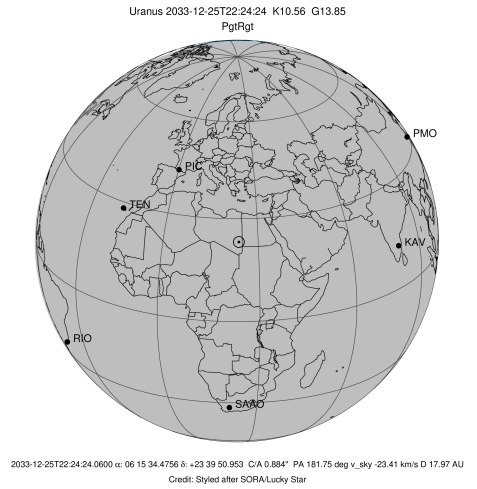
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-25T21:53:19.160		46.99	-46.55	50873.32	-23.84		
lambda	I	2033-12-25T21:53:54.643		47.12	-46.68	50026.71	-23.85		
delta	I	2033-12-25T21:55:07.121		47.39	-46.94	48300.35	-23.79		
gamma	I	2033-12-25T21:55:35.429		47.49	-47.05	47627.22	-23.77		
eta	I	2033-12-25T21:55:54.416		47.56	-47.12	47176.12	-23.75		
beta	I	2033-12-25T21:56:57.635		47.79	-47.35	45676.38	-23.69		
alpha	I	2033-12-25T21:57:38.627		47.94	-47.50	44705.16	-23.66		
4	I	2033-12-25T21:59:11.207		48.28	-47.84	42526.50	-23.55		
5	I	2033-12-25T21:59:20.618		48.32	-47.87	42293.24	-23.52		
6	I	2033-12-25T21:59:40.350		48.39	-47.94	41826.79	-23.51		
Uranus	I	2033-12-25T22:11:23.764		50.97	-50.52	25393.90		-9.69	-10.14
Uranus	E	2033-12-25T22:42:17.955		57.80	-57.33	25028.79		17.76	18.55
6	E	2033-12-25T22:53:39.235		60.31	-59.83	41869.27	23.57		
5	E	2033-12-25T22:53:51.319		60.36	-59.88	42155.80	23.58		
4	E	2033-12-25T22:54:09.579		60.42	-59.94	42604.24	23.61		
alpha	E	2033-12-25T22:55:40.269		60.76	-60.28	44746.49	23.72		
beta	E	2033-12-25T22:56:18.611		60.90	-60.42	45655.06	23.76		
eta	E	2033-12-25T22:57:22.519		61.14	-60.65	47176.12	23.82		
gamma	E	2033-12-25T22:57:41.265		61.20	-60.72	47622.80	23.84		
delta	E	2033-12-25T22:58:09.674		61.31	-60.82	48300.35	23.86		
lambda	E	2033-12-25T22:59:21.930		61.58	-61.09	50026.71	23.92		
epsilon	E	2033-12-25T23:00:12.859		61.76	-61.28	51245.97	23.91		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-25T22:20:44.500  
 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 : 3425574041647362304  
 2Mass ID (if available) : 06153447+2339509  
 ICRS Star Coord at Epoch: 06h 15m 34.47555s +23:39:50.95284s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 10.557  
 G magnitude : 13.847  
 RP magnitude : 12.901  
 BP magnitude : 14.769  
 DUPflag : 0  
 Distance (au) : 17.970  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.41  
 Sun-Target sep (deg) : 179.51  
 Sun-Moon sep (deg) : 128.82  
 B (ring opening deg) : 72.23  
 PA of pole (deg) : 64.48  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.875  
 C/A sky separation (km) : 11407.2  
 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



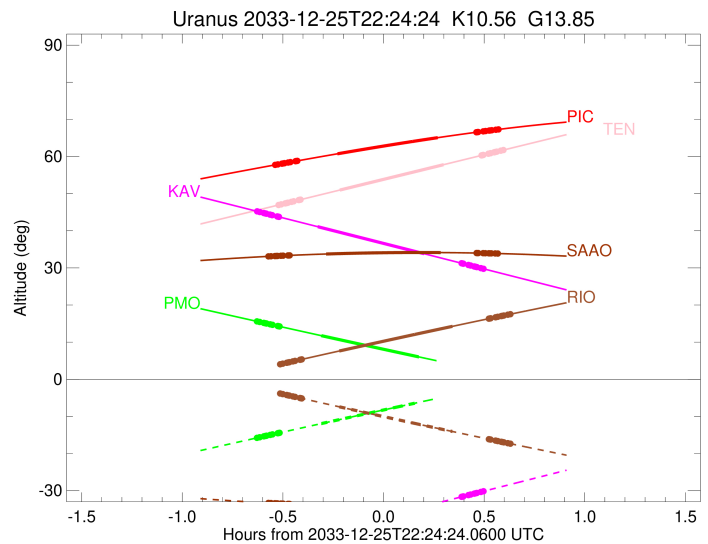
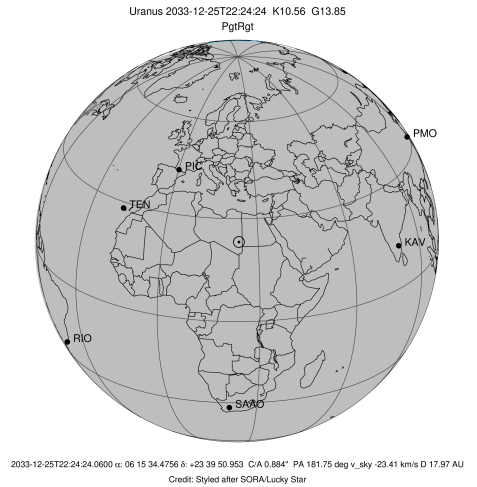
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-25T21:46:55.555		45.19	-45.59	50882.00	-23.99		
lambda	I	2033-12-25T21:47:31.175		45.05	-45.45	50026.71	-24.00		
delta	I	2033-12-25T21:48:43.184		44.78	-45.18	48300.35	-23.95		
gamma	I	2033-12-25T21:49:11.298		44.67	-45.07	47627.38	-23.93		
eta	I	2033-12-25T21:49:30.164		44.60	-45.00	47176.12	-23.91		
beta	I	2033-12-25T21:50:32.965		44.36	-44.76	45675.97	-23.86		
alpha	I	2033-12-25T21:51:13.694		44.20	-44.61	44704.19	-23.83		
4	I	2033-12-25T21:52:45.535		43.85	-44.26	42526.76	-23.73		
5	I	2033-12-25T21:52:54.786		43.82	-44.22	42295.03	-23.70		
6	I	2033-12-25T21:53:14.495		43.74	-44.15	41825.43	-23.70		
Uranus	I	2033-12-25T22:04:47.660		41.10	-41.50	25368.48		-10.43	-10.91
Uranus	E	2033-12-25T22:36:26.246		33.84	-34.25	25028.18		17.77	18.56
6	E	2033-12-25T22:47:42.620		31.25	-31.66	41868.90	23.61		
5	E	2033-12-25T22:47:54.707		31.20	-31.62	42155.97	23.62		
4	E	2033-12-25T22:48:12.952		31.13	-31.55	42604.63	23.64		
alpha	E	2033-12-25T22:49:43.544		30.79	-31.20	44746.27	23.73		
beta	E	2033-12-25T22:50:21.874		30.64	-31.05	45654.85	23.76		
eta	E	2033-12-25T22:51:25.801		30.40	-30.81	47176.12	23.81		
gamma	E	2033-12-25T22:51:44.557		30.32	-30.74	47622.84	23.82		
delta	E	2033-12-25T22:52:12.983		30.21	-30.63	48300.35	23.84		
lambda	E	2033-12-25T22:53:25.313		29.94	-30.35	50026.71	23.89		
epsilon	E	2033-12-25T22:54:16.454		29.74	-30.16	51249.33	23.88		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-25T22:28:10.550  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : RIO  
 Location : Rio de Janeiro  
 Latitude (deg) : -22.89506  
 E. Longitude (deg) : 316.77708  
 Altitude (km) : 0.033  
 Gaia source ID : 3425574041647362304  
 2Mass ID (if available) : 06153447+2339509  
 ICRS Star Coord at Epoch: 06h 15m 34.47555s +23:39:50.95284s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 10.557  
 G magnitude : 13.847  
 RP magnitude : 12.901  
 BP magnitude : 14.769  
 DUPflag : 0  
 Distance (au) : 17.970  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.41  
 Sun-Target sep (deg) : 179.51  
 Sun-Moon sep (deg) : 129.47  
 B (ring opening deg) : 72.23  
 PA of pole (deg) : 64.48  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.615  
 C/A sky separation (km) : 8019.7  
 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\_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	2033-12-25T21:53:45.997		4.08x	-3.88x	50899.43	-24.12		
lambda	I	2033-12-25T21:54:22.158		4.20x	-4.00x	50026.71	-24.13		
delta	I	2033-12-25T21:55:33.735		4.44x	-4.24x	48300.35	-24.11		
gamma	I	2033-12-25T21:56:01.643		4.54x	-4.34x	47627.69	-24.10		
eta	I	2033-12-25T21:56:20.384		4.60x	-4.40x	47176.12	-24.09		
beta	I	2033-12-25T21:57:22.712		4.82x	-4.61x	45675.07	-24.07		
alpha	I	2033-12-25T21:58:03.123		4.95x	-4.75x	44702.19	-24.06		
4	I	2033-12-25T21:59:33.877		5.26	-5.06	42527.48	-24.01		
5	I	2033-12-25T21:59:42.852		5.29	-5.09	42298.65	-24.00		
6	I	2033-12-25T22:00:02.590		5.36	-5.16	41822.54	-23.99		
Uranus	I	2033-12-25T22:11:12.706		7.61	-7.42	25299.89		-12.21	-12.77
Uranus	E	2033-12-25T22:44:55.576		14.25	-14.06	25040.65		17.55	18.33
6	E	2033-12-25T22:55:50.492		16.33	-16.15	41866.02	24.09		
5	E	2033-12-25T22:56:02.514		16.37	-16.19	42157.62	24.09		
4	E	2033-12-25T22:56:20.456		16.42	-16.24	42607.38	24.11		
alpha	E	2033-12-25T22:57:49.203		16.70	-16.52	44744.39	24.16		
beta	E	2033-12-25T22:58:26.854		16.82	-16.64	45653.18	24.18		
eta	E	2033-12-25T22:59:29.791		17.02	-16.84	47176.12	24.20		
gamma	E	2033-12-25T22:59:48.261		17.08	-16.90	47623.20	24.21		
delta	E	2033-12-25T23:00:16.225		17.16	-16.99	48300.35	24.22		
lambda	E	2033-12-25T23:01:27.463		17.39	-17.21	50026.71	24.25		
epsilon	E	2033-12-25T23:02:19.163		17.55	-17.37	51280.73	24.24		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-25T22:24:27.280  
 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 : 3425574041647362304  
 2Mass ID (if available) : 06153447+2339509  
 ICRS Star Coord at Epoch: 06h 15m 34.47555s +23:39:50.95284s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 10.557  
 G magnitude : 13.847  
 RP magnitude : 12.901  
 BP magnitude : 14.769  
 DUPflag : 0  
 Distance (au) : 17.970  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.41  
 Sun-Target sep (deg) : 179.51  
 Sun-Moon sep (deg) : 129.24  
 B (ring opening deg) : 72.23  
 PA of pole (deg) : 64.48  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.472  
 C/A sky separation (km) : 6147.1  
 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\_itrfr93\_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	2033-12-25T21:50:15.741		33.11	-33.32	50913.59	-24.53		
lambda	I	2033-12-25T21:50:51.872		33.14	-33.35	50026.71	-24.54		
delta	I	2033-12-25T21:52:02.233		33.19	-33.40	48300.35	-24.53		
gamma	I	2033-12-25T21:52:29.651		33.21	-33.42	47627.92	-24.52		
eta	I	2033-12-25T21:52:48.076		33.22	-33.44	47176.12	-24.52		
beta	I	2033-12-25T21:53:49.336		33.27	-33.48	45674.35	-24.50		
alpha	I	2033-12-25T21:54:29.061		33.29	-33.51	44700.75	-24.50		
4	I	2033-12-25T21:55:58.065		33.35	-33.58	42528.13	-24.47		
5	I	2033-12-25T21:56:06.769		33.36	-33.58	42301.09	-24.46		
6	I	2033-12-25T21:56:26.319		33.37	-33.59	41820.48	-24.45		
Uranus	I	2033-12-25T22:07:18.034		33.74	-33.98	25255.88		-13.24	-13.85
Uranus	E	2033-12-25T22:41:27.759		34.13	-34.43	25054.43		17.30	18.07
6	E	2033-12-25T22:52:10.002		34.00	-34.32	41864.76	24.46		
5	E	2033-12-25T22:52:21.926		34.00	-34.32	42158.50	24.46		
4	E	2033-12-25T22:52:39.616		33.99	-34.32	42608.41	24.47		
alpha	E	2033-12-25T22:54:07.025		33.97	-34.29	44743.58	24.50		
beta	E	2033-12-25T22:54:44.156		33.95	-34.28	45652.53	24.51		
eta	E	2033-12-25T22:55:46.280		33.93	-34.26	47176.12	24.52		
gamma	E	2033-12-25T22:56:04.515		33.93	-34.26	47623.35	24.53		
delta	E	2033-12-25T22:56:32.113		33.92	-34.25	48300.35	24.53		
lambda	E	2033-12-25T22:57:42.460		33.89	-34.22	50026.71	24.55		
epsilon	E	2033-12-25T22:58:34.013		33.87	-34.20	51292.50	24.54		