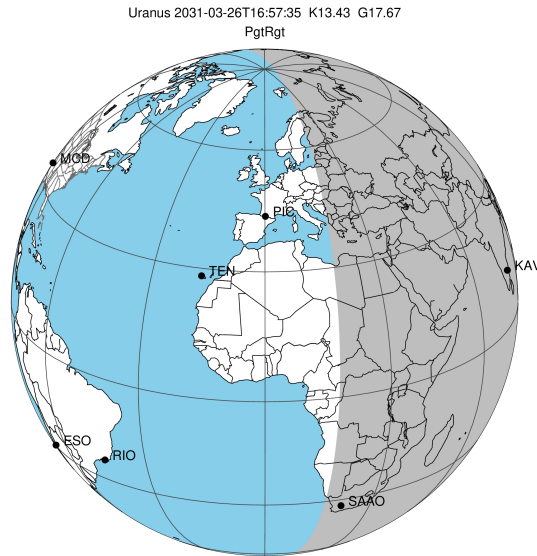


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-03-26T16:57:35.430  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3415723001575593472  
 2Mass ID (if available) : 05110873+2303544

Uranus 2031-03-26T16:57:35 K13.43 G17.67 PgtRgt

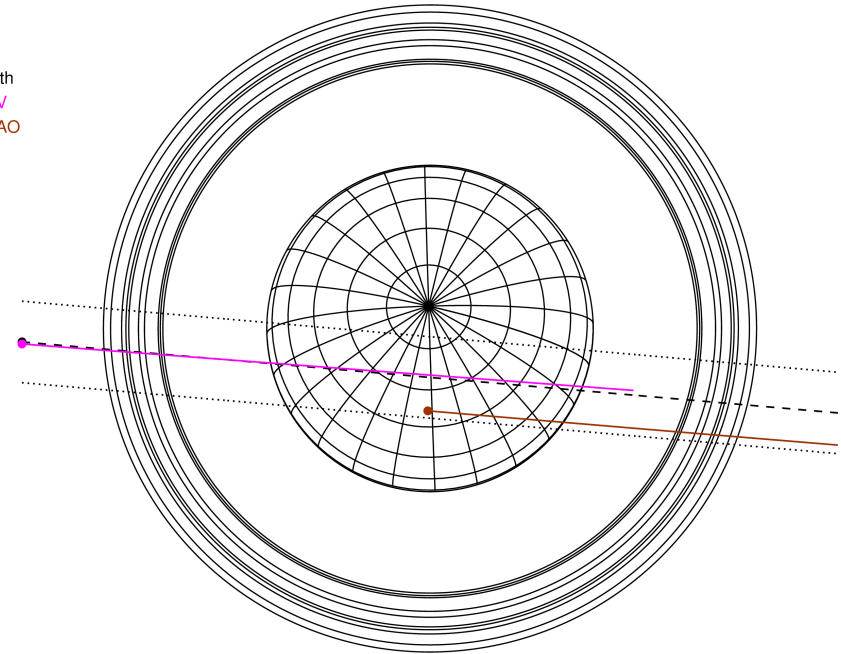
ICRS Star Coord at Epoch: 05h 11m 08.70064s +23:03:55.77073s

RUWE (>1.4 is poor) : 1.32  
 K magnitude : 13.427  
 G magnitude : 17.668  
 RP magnitude : 16.293  
 BP magnitude : 19.473  
 DUPflag : 0  
 Distance (au) : 19.397  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 14.86  
 Sun-Target sep (deg) : 73.37  
 Sun-Moon sep (deg) : 30.88  
 B (ring opening deg) : 82.10  
 PA of pole (deg) : 3.34



2031-03-26T16:57:35.4300 ex: 05 11 08.70064 s +23 03 55.771 C/A 0.538° PA 355.03 deg v\_sky +14.86 km/s D 19.40 AU  
 Credit: Styled after SORA/Lucky Star

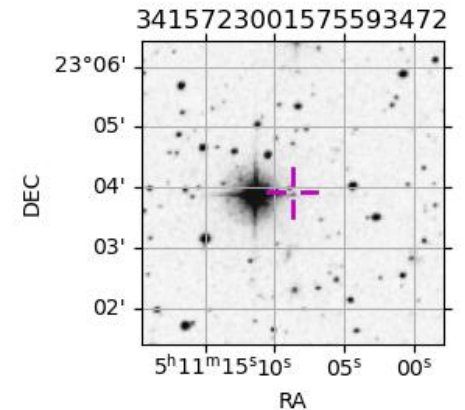
Earth  
 KAV  
 SAAO



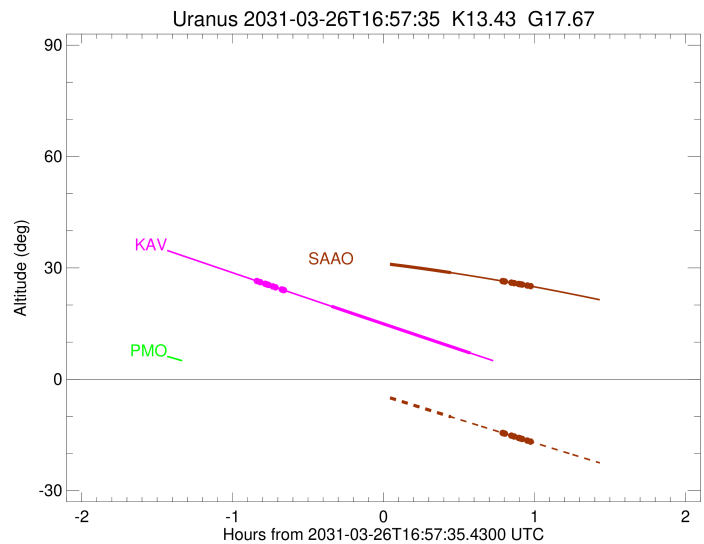
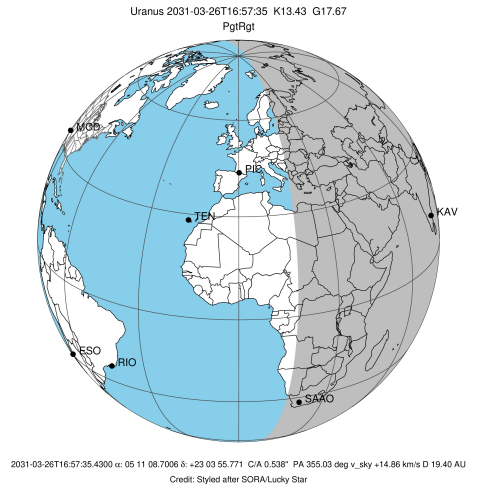
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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					PnnRnn
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	+++++	+ +		MAR 26 16:07 - MAR 26 17:32	PieRin
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					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8		+	+++++	MAR 26 17:24 - MAR 26 17:56	PneRne
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

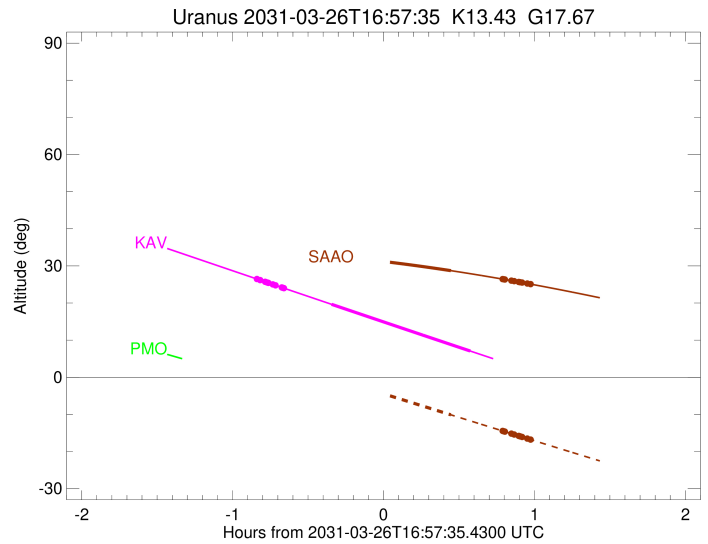
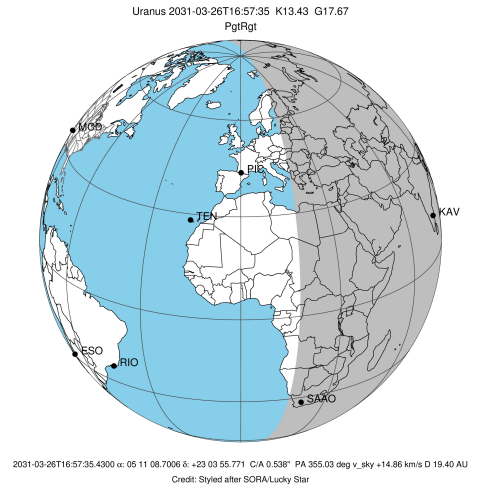


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-03-26T17:04:37.940  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KAV  
 Location : Kavalur Observatory  
 Latitude (deg) : 12.57556  
 E. Longitude (deg) : 78.83167  
 Altitude (km) : 0.722  
 Gaia source ID : 3415723001575593472  
 2Mass ID (if available) : 05110873+2303544  
 ICRS Star Coord at Epoch: 05h 11m 08.70064s +23:03:55.77073s  
 RUWE (>1.4 is poor) : 1.32  
 K magnitude : 13.427  
 G magnitude : 17.668  
 RP magnitude : 16.293  
 BP magnitude : 19.473  
 DUPflag : 0  
 Distance (au) : 19.398  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 14.86  
 Sun-Target sep (deg) : 73.37  
 Sun-Moon sep (deg) : 31.76  
 B (ring opening deg) : 82.10  
 PA of pole (deg) : 3.34  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.517  
 C/A sky separation (km) : 7279.4  
 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\_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	2031-03-26T16:07:32.590		26.41	-46.96	50928.19	-14.51		
lambda	I	2031-03-26T16:08:34.798		26.17	-47.20	50026.71	-14.49		
delta	I	2031-03-26T16:10:33.975		25.71	-47.66	48300.35	-14.48		
gamma	I	2031-03-26T16:11:20.831		25.53	-47.85	47621.87	-14.48		
eta	I	2031-03-26T16:11:51.621		25.42	-47.96	47176.12	-14.48		
beta	I	2031-03-26T16:13:34.960		25.02	-48.36	45680.60	-14.47		
alpha	I	2031-03-26T16:14:41.762		24.76	-48.62	44714.36	-14.46		
4	I	2031-03-26T16:17:09.270		24.20	-49.19	42582.43	-14.44		
5	I	2031-03-26T16:17:28.164		24.12	-49.26	42309.39	-14.44		
6	I	2031-03-26T16:17:58.438		24.01	-49.38	41872.14	-14.44		
Uranus	I	2031-03-26T16:36:57.202		19.65	-53.73	25544.82		-1.22	-1.28
Uranus	E	2031-03-26T17:32:05.537		7.06	-65.56	25459.21		-3.24	-3.39
6	E	2031-03-26T17:50:50.723		2.83x	-69.07	41812.93	14.65		
5	E	2031-03-26T17:51:14.027		2.74x	-69.14	42154.87	14.65		
4	E	2031-03-26T17:51:40.825		2.64x	-69.22	42545.65	14.66		
alpha	E	2031-03-26T17:54:08.382		2.09x	-69.64	44711.44	14.68		
beta	E	2031-03-26T17:55:11.677		1.85x	-69.82	45641.11	14.70		
eta	E	2031-03-26T17:56:56.080		1.46x	-70.11	47176.12	14.71		
gamma	E	2031-03-26T17:57:27.018		1.34x	-70.19	47631.37	14.72		
delta	E	2031-03-26T17:58:12.462		1.17x	-70.32	48300.35	14.72		
lambda	E	2031-03-26T18:00:09.642		0.73x	-70.63	50026.71	14.74		
epsilon	E	2031-03-26T18:01:46.512		0.37x	-70.89	51455.30	14.76		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-03-26T16:59:19.900  
 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 : 3415723001575593472  
 2Mass ID (if available) : 05110873+2303544  
 ICRS Star Coord at Epoch: 05h 11m 08.70064s +23:03:55.77073s  
 RUWE (>1.4 is poor) : 1.32  
 K magnitude : 13.427  
 G magnitude : 17.668  
 RP magnitude : 16.293  
 BP magnitude : 19.473  
 DUPflag : 0  
 Distance (au) : 19.398  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 14.86  
 Sun-Target sep (deg) : 73.37  
 Sun-Moon sep (deg) : 31.34  
 B (ring opening deg) : 82.10  
 PA of pole (deg) : 3.34  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.915  
 C/A sky separation (km) : 12878.5  
 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	2031-03-26T16:02:32.404		34.28	7.18x	50964.11	-13.99		
lambda	I	2031-03-26T16:03:39.561		34.25	6.94x	50026.71	-13.95		
delta	I	2031-03-26T16:05:43.480		34.18	6.51x	48300.35	-13.91		
gamma	I	2031-03-26T16:06:32.247		34.15	6.34x	47622.23	-13.90		
eta	I	2031-03-26T16:07:04.358		34.14	6.22x	47176.12	-13.89		
beta	I	2031-03-26T16:08:52.238		34.07	5.84x	45679.89	-13.85		
alpha	I	2031-03-26T16:10:02.307		34.03	5.60x	44710.37	-13.82		
4	I	2031-03-26T16:12:37.020		33.93	5.06x	42576.79	-13.75		
5	I	2031-03-26T16:12:56.752		33.92	4.99x	42304.94	-13.75		
6	I	2031-03-26T16:13:28.008		33.90	4.88x	41874.97	-13.74		
Uranus	I	2031-03-26T16:34:01.531		32.87	0.54x	25475.06		-2.97	-3.11
Uranus	E	2031-03-26T17:24:24.189		28.72	-10.12	25329.25		-4.94	-5.17
6	E	2031-03-26T17:44:54.807		26.45	-14.45	41818.35	13.82		
5	E	2031-03-26T17:45:19.095		26.40	-14.53	42155.35	13.83		
4	E	2031-03-26T17:45:47.170		26.34	-14.63	42540.49	13.83		
alpha	E	2031-03-26T17:48:23.205		26.03	-15.18	44706.92	13.91		
beta	E	2031-03-26T17:49:30.351		25.90	-15.41	45641.50	13.94		
eta	E	2031-03-26T17:51:20.314		25.68	-15.80	47176.12	13.98		
gamma	E	2031-03-26T17:51:52.879		25.61	-15.91	47631.51	13.99		
delta	E	2031-03-26T17:52:40.658		25.51	-16.08	48300.35	14.01		
lambda	E	2031-03-26T17:54:43.731		25.26	-16.51	50026.71	14.05		
epsilon	E	2031-03-26T17:56:27.460		25.04	-16.87	51485.38	14.09		