

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-04-13T16:31:35.860  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3368258523418884224  
 2Mass ID (if available) : 07061298+2300046

ICRS Star Coord at Epoch: 07h 06m 13.02633s +23:00:03.70544s

RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.588  
 G magnitude : 18.160  
 RP magnitude : 17.011  
 BP magnitude : 19.560  
 DUPflag : 0  
 Distance (au) : 18.868  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 10.78  
 Sun-Target sep (deg) : 81.64  
 Sun-Moon sep (deg) : 103.80  
 B (ring opening deg) : 61.34  
 PA of pole (deg) : 79.42

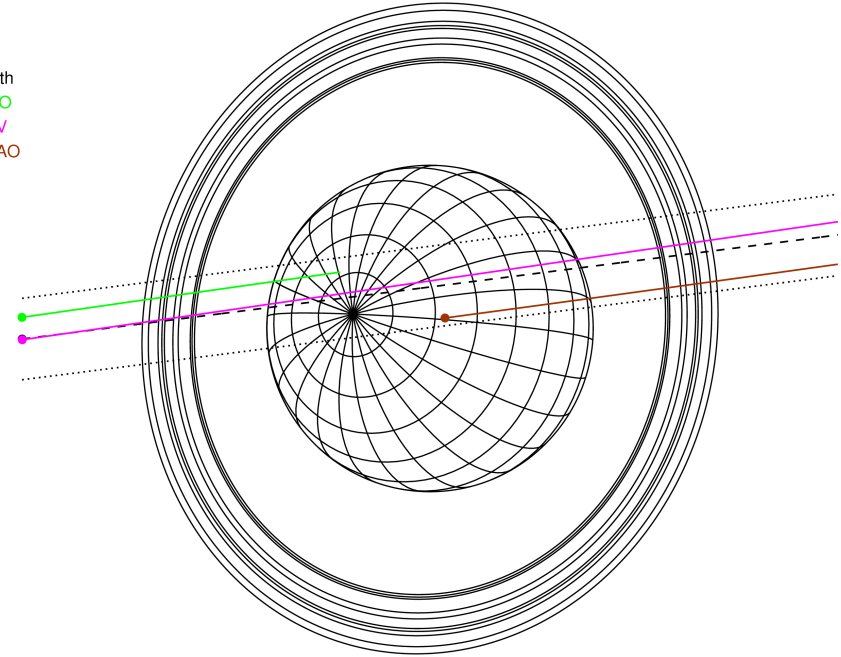
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2037-04-13T16:31:35.8600 ex: 07 06 13.02633 s: +23 00 03.705 C/A 0.4811 PA 187.27 deg v\_sky +10.78 km/s D 18.87 AU  
 Credit: Styled after SORA/Lucky Star

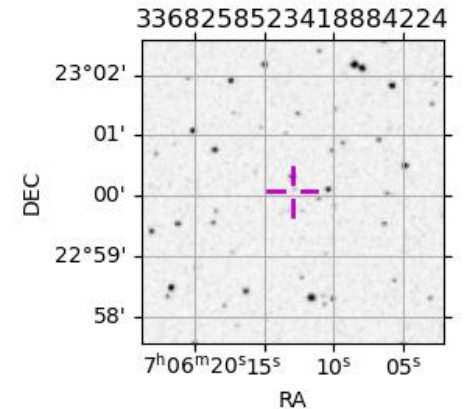
Uranus 2037-04-13T16:31:35 K14.59 G18.16 PgtRgt

Earth  
 PMO  
 KAV  
 SAAO

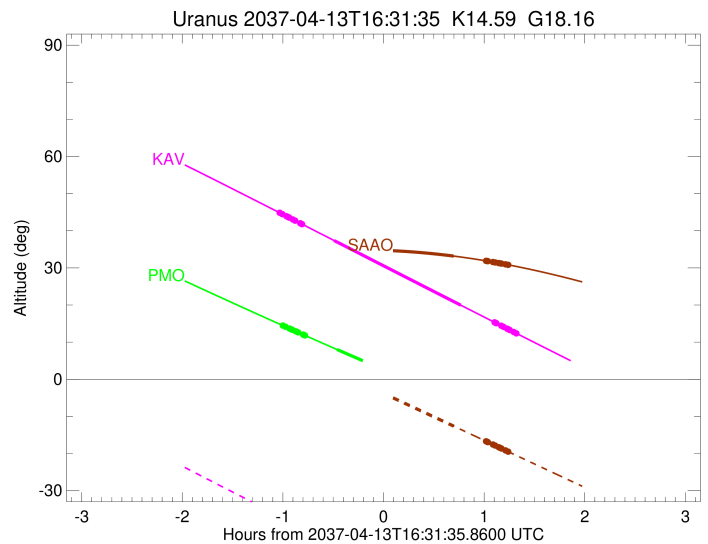
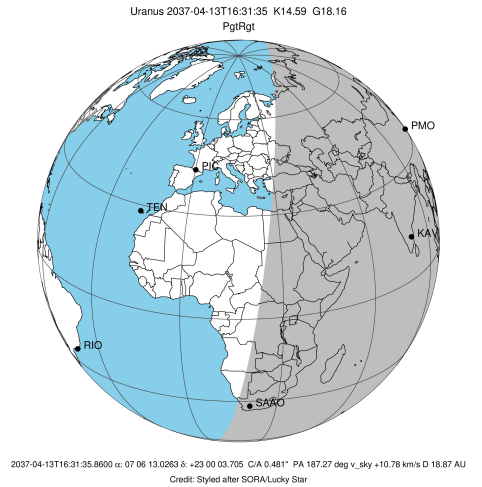


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++	+		APR 13 15:31 - APR 13 16:03	PinRin
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	+++++	+	+++++	APR 13 15:29 - APR 13 17:50	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					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8		+	+++++	APR 13 17:13 - APR 13 17:46	PneRne
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



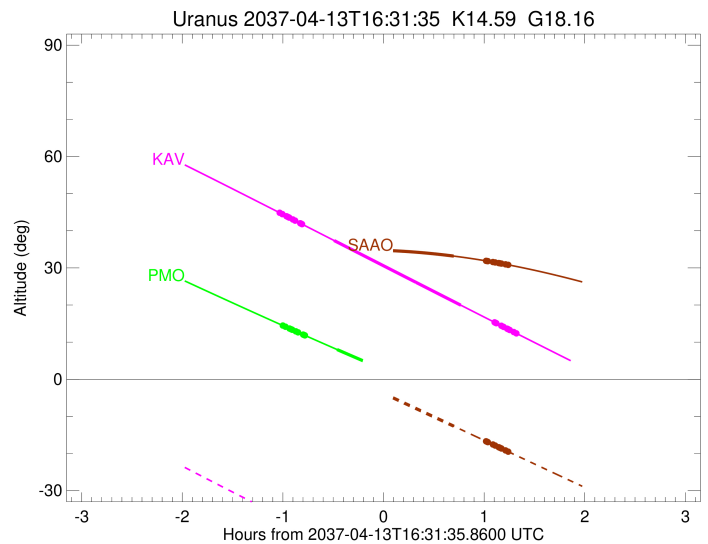
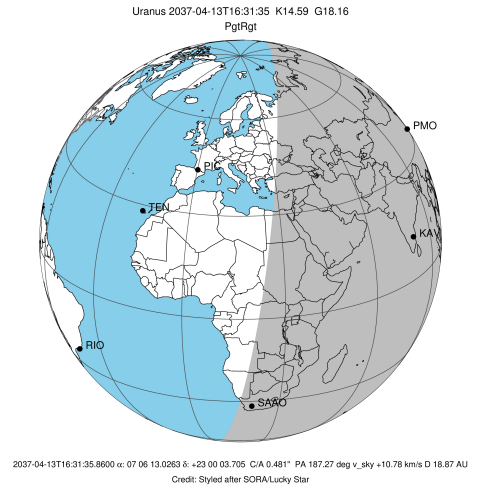
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-04-13T16:38:43.460  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 3368258523418884224  
 2Mass ID (if available) : 07061298+2300046  
 ICRS Star Coord at Epoch: 07h 06m 13.02633s +23:00:03.70544s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.588  
 G magnitude : 18.160  
 RP magnitude : 17.011  
 BP magnitude : 19.560  
 DUPflag : 0  
 Distance (au) : 18.868  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 10.78  
 Sun-Target sep (deg) : 81.64  
 Sun-Moon sep (deg) : 103.67  
 B (ring opening deg) : 61.34  
 PA of pole (deg) : 79.42  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.782  
 C/A sky separation (km) : 10700.4  
 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\_itrf93\_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

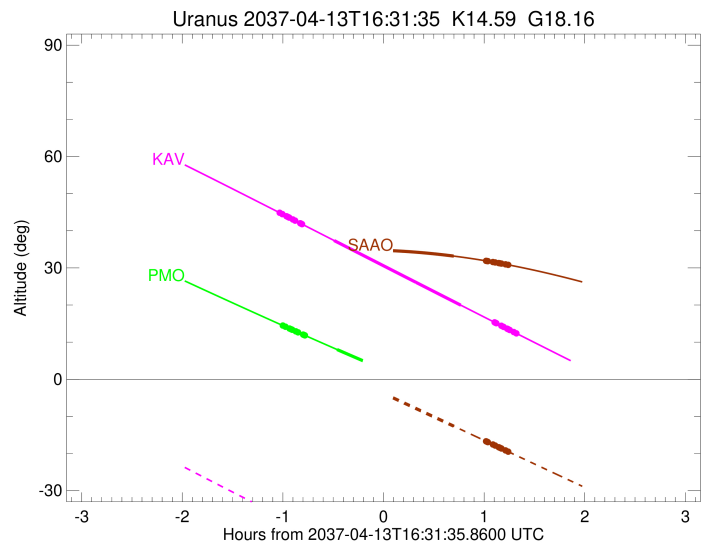
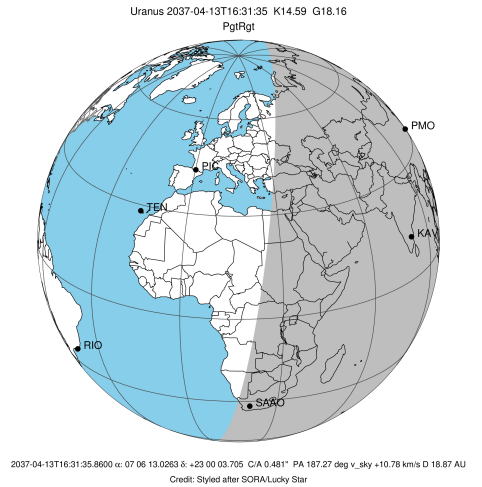
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-04-13T15:31:32.757		14.47	-48.01	51185.80	-11.86		
lambda	I	2037-04-13T15:33:10.712		14.15	-48.08	50026.71	-11.83		
delta	I	2037-04-13T15:35:36.762		13.65	-48.18	48300.35	-11.81		
gamma	I	2037-04-13T15:36:33.750		13.46	-48.22	47627.40	-11.80		
eta	I	2037-04-13T15:37:11.984		13.33	-48.25	47176.12	-11.80		
beta	I	2037-04-13T15:39:21.989		12.90	-48.33	45641.10	-11.78		
alpha	I	2037-04-13T15:40:39.214		12.64	-48.37	44727.15	-11.77		
4	I	2037-04-13T15:43:40.814		12.03	-48.46	42586.75	-11.74		
5	I	2037-04-13T15:44:15.647		11.92	-48.48	42168.24	-11.72		
6	I	2037-04-13T15:44:42.797		11.83	-48.49	41868.23	-11.73		
Uranus	I	2037-04-13T16:03:51.254		8.02	-48.77	25114.84		28.45	29.58
Uranus	E	2037-04-13T17:13:43.154		-5.27x	-45.61	25319.50		-20.35	-21.23
6	E	2037-04-13T17:34:23.842		-8.97x	-43.55	41795.91	11.96		
5	E	2037-04-13T17:35:05.721		-9.09x	-43.47	42271.21	11.96		
4	E	2037-04-13T17:35:30.464		-9.17x	-43.43	42578.38	11.98		
alpha	E	2037-04-13T17:38:26.600		-9.68x	-43.10	44695.59	12.02		
beta	E	2037-04-13T17:39:48.020		-9.92x	-42.94	45678.32	12.04		
eta	E	2037-04-13T17:41:52.070		-10.28x	-42.70	47176.12	12.07		
gamma	E	2037-04-13T17:42:29.073		-10.38x	-42.63	47622.98	12.08		
delta	E	2037-04-13T17:43:25.121		-10.54x	-42.52	48300.35	12.09		
lambda	E	2037-04-13T17:45:47.742		-10.95x	-42.24	50026.71	12.12		
epsilon	E	2037-04-13T17:47:30.733		-11.25x	-42.03	51275.66	12.16		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-04-13T16:39:55.740  
 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 : 3368258523418884224  
 2Mass ID (if available) : 07061298+2300046  
 ICRS Star Coord at Epoch: 07h 06m 13.02633s +23:00:03.70544s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.588  
 G magnitude : 18.160  
 RP magnitude : 17.011  
 BP magnitude : 19.560  
 DUPflag : 0  
 Distance (au) : 18.868  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 10.78  
 Sun-Target sep (deg) : 81.64  
 Sun-Moon sep (deg) : 104.06  
 B (ring opening deg) : 61.34  
 PA of pole (deg) : 79.42  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.539  
 C/A sky separation (km) : 7380.1  
 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\_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	2037-04-13T15:29:42.560		44.85	-36.81	51157.59	-11.67		
lambda	I	2037-04-13T15:31:19.574		44.48	-37.18	50026.71	-11.66		
delta	I	2037-04-13T15:33:47.722		43.91	-37.74	48300.35	-11.65		
gamma	I	2037-04-13T15:34:45.457		43.69	-37.95	47627.78	-11.65		
eta	I	2037-04-13T15:35:24.235		43.54	-38.10	47176.12	-11.65		
beta	I	2037-04-13T15:37:35.874		43.03	-38.59	45641.28	-11.64		
alpha	I	2037-04-13T15:38:53.823		42.73	-38.88	44729.74	-11.63		
4	I	2037-04-13T15:41:57.929		42.03	-39.57	42583.12	-11.62		
5	I	2037-04-13T15:42:32.389		41.90	-39.70	42172.24	-11.61		
6	I	2037-04-13T15:43:00.125		41.79	-39.80	41870.60	-11.62		
Uranus	I	2037-04-13T16:02:05.356		37.39	-44.02	25109.43		28.65	29.77
Uranus	E	2037-04-13T17:17:43.645		19.95	-59.22	25260.58		-22.88	-23.85
6	E	2037-04-13T17:37:44.863		15.36	-62.50	41796.80	11.89		
5	E	2037-04-13T17:38:27.379		15.19	-62.60	42276.56	11.89		
4	E	2037-04-13T17:38:51.527		15.10	-62.66	42574.98	11.90		
alpha	E	2037-04-13T17:41:49.391		14.42	-63.10	44697.43	11.92		
beta	E	2037-04-13T17:43:11.391		14.11	-63.29	45679.01	11.94		
eta	E	2037-04-13T17:45:16.547		13.63	-63.59	47176.12	11.95		
gamma	E	2037-04-13T17:45:53.945		13.49	-63.68	47623.26	11.96		
delta	E	2037-04-13T17:46:50.548		13.28	-63.80	48300.35	11.97		
lambda	E	2037-04-13T17:49:14.726		12.73	-64.13	50026.71	11.98		
epsilon	E	2037-04-13T17:50:56.929		12.34	-64.35	51251.86	12.01		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-04-13T16:33:14.810  
 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 : 3368258523418884224  
 2Mass ID (if available) : 07061298+2300046  
 ICRS Star Coord at Epoch: 07h 06m 13.02633s +23:00:03.70544s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.588  
 G magnitude : 18.160  
 RP magnitude : 17.011  
 BP magnitude : 19.560  
 DUPflag : 0  
 Distance (au) : 18.868  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 10.78  
 Sun-Target sep (deg) : 81.64  
 Sun-Moon sep (deg) : 104.28  
 B (ring opening deg) : 61.34  
 PA of pole (deg) : 79.42  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.096  
 C/A sky separation (km) : 1320.0  
 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	2037-04-13T15:20:38.643		33.26	10.78x	51113.48	-11.69		
lambda	I	2037-04-13T15:22:11.635		33.35	10.47x	50026.71	-11.69		
delta	I	2037-04-13T15:24:39.361		33.48	9.97x	48300.35	-11.69		
gamma	I	2037-04-13T15:25:36.864		33.53	9.78x	47628.37	-11.69		
eta	I	2037-04-13T15:26:15.566		33.56	9.65x	47176.12	-11.69		
beta	I	2037-04-13T15:28:26.692		33.67	9.21x	45641.80	-11.68		
alpha	I	2037-04-13T15:29:44.071		33.73	8.95x	44733.69	-11.68		
4	I	2037-04-13T15:32:48.242		33.87	8.33x	42577.18	-11.68		
5	I	2037-04-13T15:33:21.339		33.90	8.21x	42179.53	-11.68		
6	I	2037-04-13T15:33:49.515		33.92	8.12x	41873.87	-11.68		
Uranus	I	2037-04-13T15:52:58.118		34.57	4.21x	25138.88		27.58	28.68
Uranus	E	2037-04-13T17:13:28.890		33.18	-12.63	25166.91		-26.55	-27.62
6	E	2037-04-13T17:32:40.695		31.90	-16.69	41799.31	11.75		
5	E	2037-04-13T17:33:24.258		31.85	-16.84	42286.64	11.75		
4	E	2037-04-13T17:33:47.246		31.82	-16.93	42568.03	11.75		
alpha	E	2037-04-13T17:36:48.352		31.58	-17.56	44701.53	11.76		
beta	E	2037-04-13T17:38:11.251		31.47	-17.86	45680.14	11.76		
eta	E	2037-04-13T17:40:18.255		31.30	-18.30	47176.12	11.76		
gamma	E	2037-04-13T17:40:56.316		31.25	-18.44	47623.89	11.77		
delta	E	2037-04-13T17:41:53.810		31.17	-18.64	48300.35	11.77		
lambda	E	2037-04-13T17:44:20.507		30.96	-19.16	50026.71	11.77		
epsilon	E	2037-04-13T17:46:00.239		30.82	-19.51	51200.67	11.77		