

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-21T22:12:22.250
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3368256328692467584
 2Mass ID (if available) : 07065802+2259326

ICRS Star Coord at Epoch: 07h 06m 58.03162s +22:59:32.53706s

RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.867
 G magnitude : 15.817
 RP magnitude : 15.523
 BP magnitude : 15.974
 DUPflag : 0
 Distance (au) : 18.077
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.57
 Sun-Target sep (deg) : 132.26
 Sun-Moon sep (deg) : 58.42
 B (ring opening deg) : 61.17
 PA of pole (deg) : 79.56

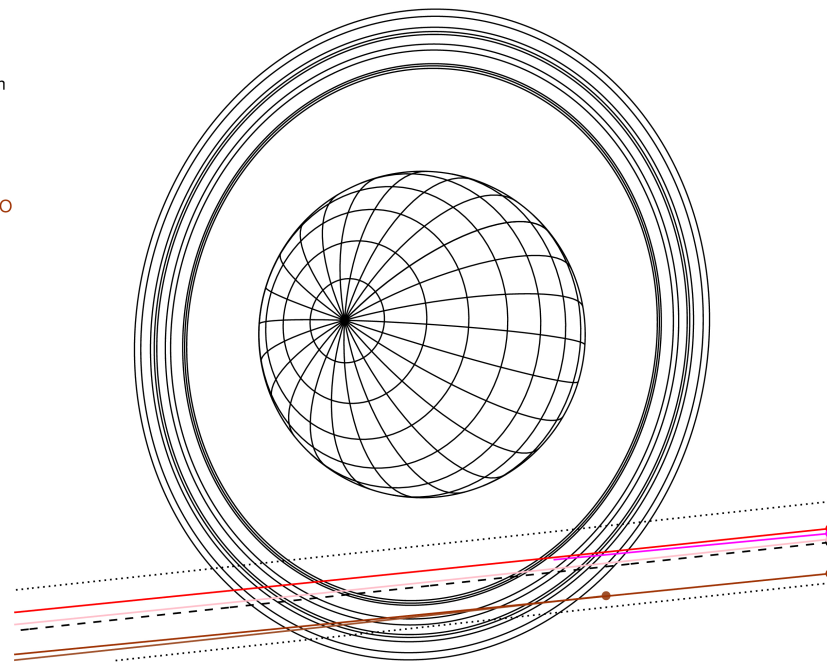
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2037-02-21T22:12:22.2500 a: 07 06 58.0316 s: +22 59 32.537 C/A 2.987" PA 6.19 deg v_sky -13.57 km/s D 18.08 AU
 Credit: Styled after SORA/Lucky Star

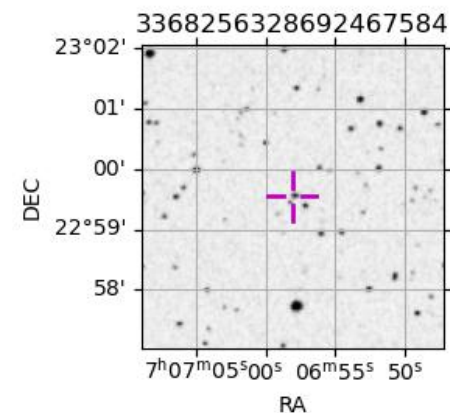
Uranus 2037-02-21T22:12:22 K14.87 G15.82 XRgt

Earth
 PIC
 TEN
 KAV
 RIO
 SAAO

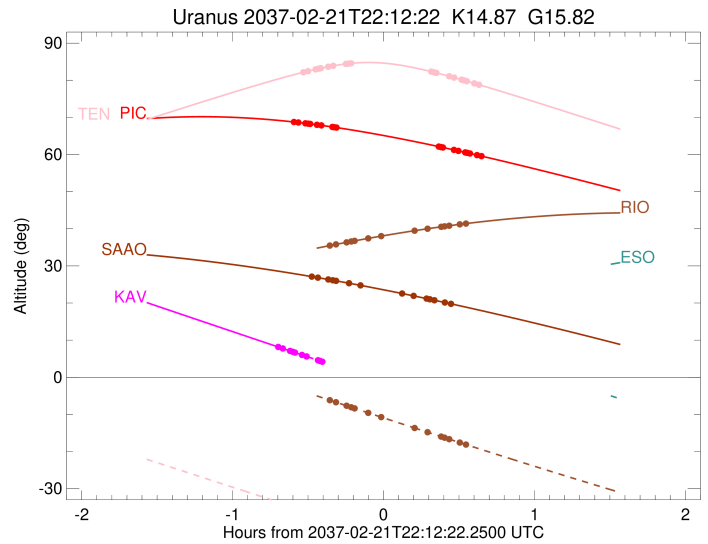
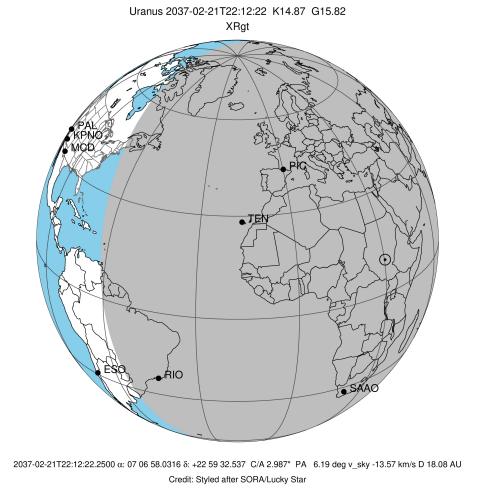


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	FEB 21 21:36 - FEB 21 22:50	PnnRie
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	+++++		+++++	FEB 21 21:40 - FEB 21 22:49	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++			FEB 21 21:30 - FEB 21 21:41	PnnRin
RIO	Rio de Janeiro	-22.9	316.8	+++++		+++++	FEB 21 21:50 - FEB 21 22:44	PnnRie
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	+++++		+++++	FEB 21 21:43 - FEB 21 22:38	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-21T22:11:10.860
 Event type : XRgt
 : No Uranus occs
 : 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 : 3368256328692467584
 2Mass ID (if available) : 07065802+2259326
 ICRS Star Coord at Epoch: 07h 06m 58.03162s +22:59:32.53706s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.867
 G magnitude : 15.817
 RP magnitude : 15.523
 BP magnitude : 15.974
 DUPflag : 0
 Distance (au) : 18.077
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.57
 Sun-Target sep (deg) : 132.26
 Sun-Moon sep (deg) : 59.25
 B (ring opening deg) : 61.17
 PA of pole (deg) : 79.56
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.811
 C/A sky separation (km) : 36854.2
 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

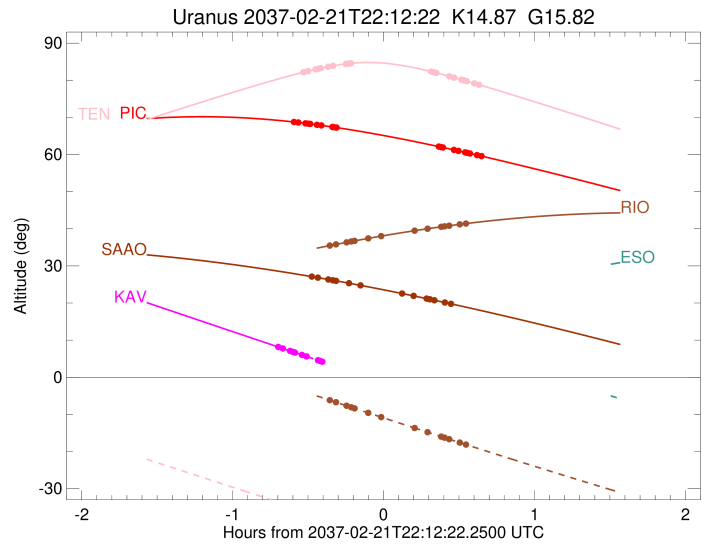
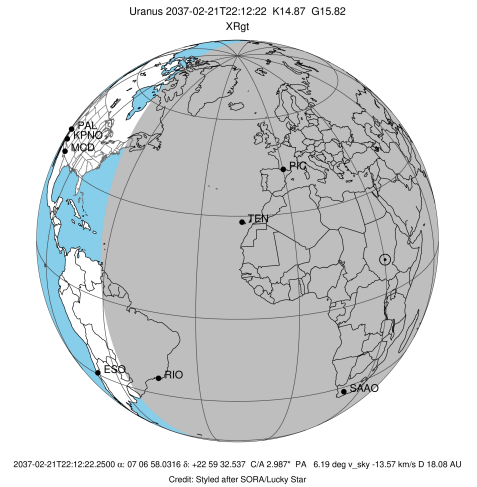


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-02-21T21:36:30.650		68.79	-42.93	51333.40	-10.75		
lambda	I	2037-02-21T21:38:33.093		68.63	-43.24	50026.71	-10.51		
delta	I	2037-02-21T21:41:21.200		68.41	-43.67	48300.35	-10.02		
gamma	I	2037-02-21T21:42:29.643		68.31	-43.85	47621.63	-9.81		
eta	I	2037-02-21T21:43:15.402		68.24	-43.96	47176.12	-9.66		
beta	I	2037-02-21T21:45:55.970		68.01	-44.37	45669.86	-9.12		
alpha	I	2037-02-21T21:47:46.826		67.84	-44.65	44685.00	-8.70		
4	I	2037-02-21T21:52:00.583		67.43	-45.28	42611.85	-7.65		
5	I	2037-02-21T21:52:56.872		67.34	-45.42	42194.55	-7.43		
6	I	2037-02-21T21:53:48.618		67.25	-45.54	41808.29	-7.14		

No planet occultations

6	E	2037-02-21T22:34:13.570		62.16	-50.97	41795.08	7.13		
5	E	2037-02-21T22:35:18.317		62.00	-51.10	42270.48	7.41		
4	E	2037-02-21T22:35:58.938		61.90	-51.18	42575.41	7.63		
alpha	E	2037-02-21T22:40:20.294		61.26	-51.68	44710.36	8.68		
beta	E	2037-02-21T22:42:09.324		60.98	-51.89	45681.09	9.09		
eta	E	2037-02-21T22:44:48.931		60.58	-52.18	47176.12	9.63		
gamma	E	2037-02-21T22:45:35.470		60.46	-52.27	47627.77	9.78		
delta	E	2037-02-21T22:46:43.519		60.29	-52.39	48300.35	9.99		
lambda	E	2037-02-21T22:49:32.237		59.85	-52.69	50026.71	10.47		
epsilon	E	2037-02-21T22:50:45.406		59.66	-52.82	50799.81	10.71		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-21T22:12:26.410
 Event type : XRgt
 : No Uranus occs
 : 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 : 3368256328692467584
 2Mass ID (if available) : 07065802+2259326
 ICRS Star Coord at Epoch: 07h 06m 58.03162s +22:59:32.53706s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.867
 G magnitude : 15.817
 RP magnitude : 15.523
 BP magnitude : 15.974
 DUPflag : 0
 Distance (au) : 18.077
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.57
 Sun-Target sep (deg) : 132.26
 Sun-Moon sep (deg) : 59.22
 B (ring opening deg) : 61.17
 PA of pole (deg) : 79.56
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.948
 C/A sky separation (km) : 38655.2
 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

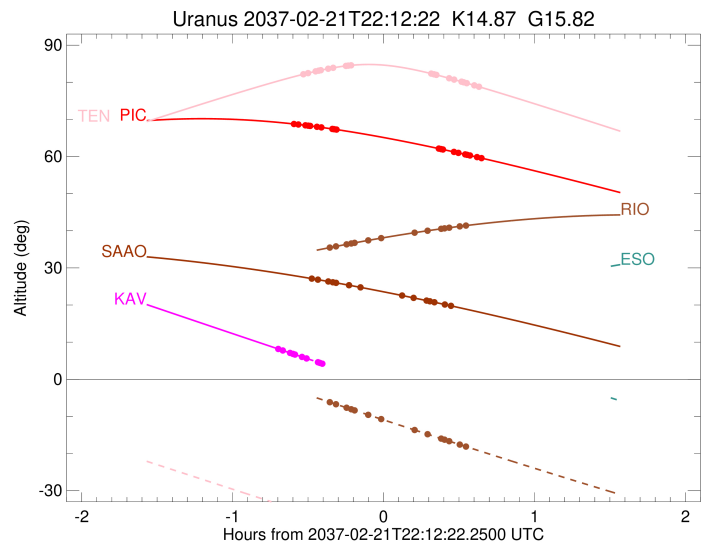
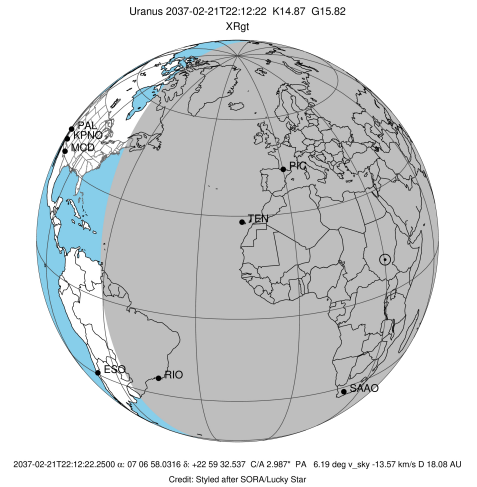


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-02-21T21:40:16.645		82.12	-35.73	51314.40	-10.17		
lambda	I	2037-02-21T21:42:24.496		82.48	-36.19	50026.71	-9.88		
delta	I	2037-02-21T21:45:24.343		82.95	-36.84	48300.35	-9.31		
gamma	I	2037-02-21T21:46:38.268		83.13	-37.11	47621.80	-9.05		
eta	I	2037-02-21T21:47:27.998		83.26	-37.29	47176.12	-8.87		
beta	I	2037-02-21T21:50:24.360		83.66	-37.93	45671.12	-8.21		
alpha	I	2037-02-21T21:52:28.699		83.91	-38.38	44685.49	-7.69		
4	I	2037-02-21T21:57:24.769		84.41	-39.45	42609.76	-6.32		
5	I	2037-02-21T21:58:31.798		84.50	-39.70	42201.62	-6.03		
6	I	2037-02-21T21:59:38.731		84.58	-39.94	41805.17	-5.64		

No planet occultations

6	E	2037-02-21T22:31:10.611		82.37	-46.70	41794.75	5.63		
5	E	2037-02-21T22:32:30.464		82.15	-46.98	42262.92	6.02		
4	E	2037-02-21T22:33:21.819		82.00	-47.16	42579.81	6.32		
alpha	E	2037-02-21T22:38:25.044		81.10	-48.23	44707.76	7.68		
beta	E	2037-02-21T22:40:27.385		80.72	-48.65	45681.21	8.20		
eta	E	2037-02-21T22:43:22.510		80.17	-49.27	47176.12	8.86		
gamma	E	2037-02-21T22:44:12.933		80.01	-49.44	47627.43	9.04		
delta	E	2037-02-21T22:45:26.342		79.77	-49.70	48300.35	9.29		
lambda	E	2037-02-21T22:48:26.472		79.18	-50.32	50026.71	9.87		
epsilon	E	2037-02-21T22:49:45.106		78.92	-50.59	50811.72	10.15		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-21T22:05:34.880
 Event type : XRgt
 : No Uranus occs
 : 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 : 3368256328692467584
 2Mass ID (if available) : 07065802+2259326
 ICRS Star Coord at Epoch: 07h 06m 58.03162s +22:59:32.53706s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.867
 G magnitude : 15.817
 RP magnitude : 15.523
 BP magnitude : 15.974
 DUPflag : 0
 Distance (au) : 18.077
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.57
 Sun-Target sep (deg) : 132.26
 Sun-Moon sep (deg) : 58.86
 B (ring opening deg) : 61.17
 PA of pole (deg) : 79.56
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.828
 C/A sky separation (km) : 37080.0
 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

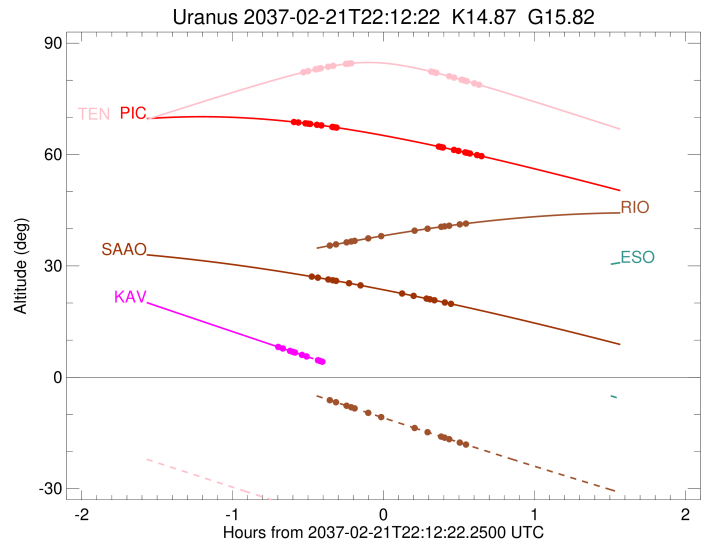
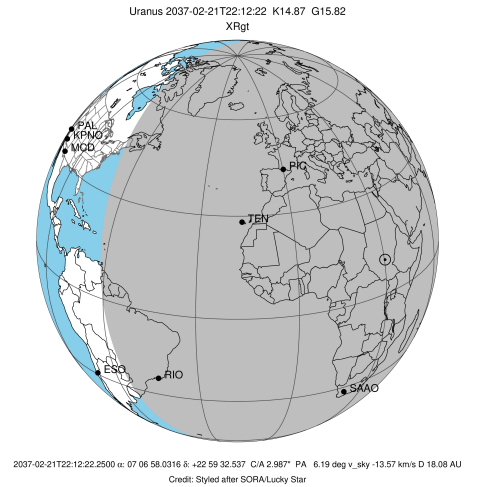


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-02-21T21:30:16.273		8.22	-52.66	51328.63	-10.45		
lambda	I	2037-02-21T21:32:21.817		7.75	-52.15	50026.71	-10.21		
delta	I	2037-02-21T21:35:15.032		7.09	-51.45	48300.35	-9.72		
gamma	I	2037-02-21T21:36:25.638		6.83	-51.16	47621.66	-9.51		
eta	I	2037-02-21T21:37:12.881		6.65	-50.97	47176.12	-9.36		
beta	I	2037-02-21T21:39:58.836		6.02	-50.29	45670.12	-8.81		
alpha	I	2037-02-21T21:41:53.694		5.59	-49.82	44685.09	-8.39		
4	I	2037-02-21T21:46:17.616		4.59x	-48.75	42611.51	-7.33		
5	I	2037-02-21T21:47:16.147		4.37x	-48.51	42195.75	-7.11		
6	I	2037-02-21T21:48:10.611		4.16x	-48.29	41807.74	-6.82		

No planet occultations

6	E	2037-02-21T22:28:45.184		-4.93x	-38.39	41795.05	6.78		
5	E	2037-02-21T22:29:53.192		-5.18x	-38.12	42270.11	7.06		
4	E	2037-02-21T22:30:35.888		-5.34x	-37.94	42575.63	7.28		
alpha	E	2037-02-21T22:35:09.083		-6.35x	-36.83	44710.25	8.32		
beta	E	2037-02-21T22:37:02.725		-6.77x	-36.37	45681.10	8.73		
eta	E	2037-02-21T22:39:48.802		-7.38x	-35.70	47176.12	9.26		
gamma	E	2037-02-21T22:40:37.180		-7.56x	-35.50	47627.76	9.41		
delta	E	2037-02-21T22:41:47.889		-7.82x	-35.21	48300.35	9.61		
lambda	E	2037-02-21T22:44:43.062		-8.46x	-34.50	50026.71	10.09		
epsilon	E	2037-02-21T22:45:59.000		-8.74x	-34.19	50800.01	10.32		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-21T22:14:40.160
 Event type : XRgt
 : No Uranus occs
 : 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 : 3368256328692467584
 2Mass ID (if available) : 07065802+2259326
 ICRS Star Coord at Epoch: 07h 06m 58.03162s +22:59:32.53706s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.867
 G magnitude : 15.817
 RP magnitude : 15.523
 BP magnitude : 15.974
 DUPflag : 0
 Distance (au) : 18.077
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.57
 Sun-Target sep (deg) : 132.26
 Sun-Moon sep (deg) : 58.72
 B (ring opening deg) : 61.17
 PA of pole (deg) : 79.56
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.344
 C/A sky separation (km) : 43845.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl1.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

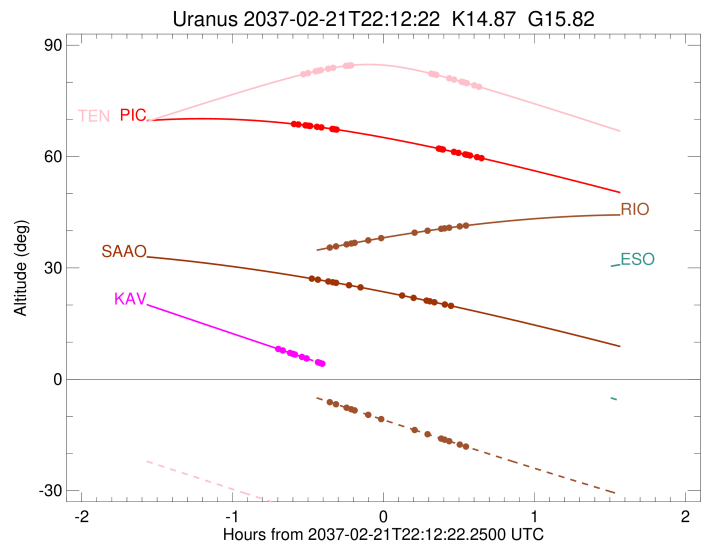
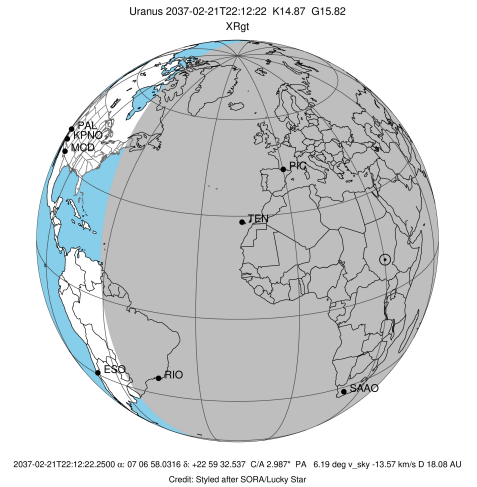


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-02-21T21:50:50.800		35.45	-6.14	51247.22	-7.82		
lambda	I	2037-02-21T21:53:30.751		35.80	-6.73	50026.71	-7.33		
delta	I	2037-02-21T21:57:44.003		36.35	-7.68	48300.35	-6.29		
gamma	I	2037-02-21T21:59:36.179		36.58	-8.09	47622.56	-5.79		
eta	I	2037-02-21T22:00:55.734		36.75	-8.39	47176.12	-5.43		
beta	I	2037-02-21T22:06:18.367		37.41	-9.59	45675.76	-3.86		
alpha	I	2037-02-21T22:11:48.842		38.06	-10.81	44690.52	-2.11		

No planet occultations

alpha	E	2037-02-21T22:24:26.761		39.46	-13.60	44696.60	2.11		
beta	E	2037-02-21T22:29:54.855		40.01	-14.80	45680.55	3.86		
eta	E	2037-02-21T22:35:15.666		40.53	-15.98	47176.12	5.44		
gamma	E	2037-02-21T22:36:35.751		40.65	-16.27	47626.18	5.80		
delta	E	2037-02-21T22:38:27.160		40.82	-16.67	48300.35	6.30		
lambda	E	2037-02-21T22:42:40.037		41.19	-17.59	50026.71	7.34		
epsilon	E	2037-02-21T22:44:30.239		41.35	-17.99	50858.82	7.84		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-21T22:08:10.850
 Event type : XRgt
 : No Uranus occs
 : 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 : 3368256328692467584
 2Mass ID (if available) : 07065802+2259326
 ICRS Star Coord at Epoch: 07h 06m 58.03162s +22:59:32.53706s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.867
 G magnitude : 15.817
 RP magnitude : 15.523
 BP magnitude : 15.974
 DUPflag : 0
 Distance (au) : 18.077
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.57
 Sun-Target sep (deg) : 132.26
 Sun-Moon sep (deg) : 58.99
 B (ring opening deg) : 61.17
 PA of pole (deg) : 79.56
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.329
 C/A sky separation (km) : 43640.4
 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



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	2037-02-21T21:43:41.891		27.13	-44.73	51246.91	-7.93		
lambda	I	2037-02-21T21:46:19.473		26.83	-44.95	50026.71	-7.45		
delta	I	2037-02-21T21:50:27.729		26.34	-45.28	48300.35	-6.44		
gamma	I	2037-02-21T21:52:16.933		26.12	-45.41	47622.55	-5.97		
eta	I	2037-02-21T21:53:33.973		25.96	-45.51	47176.12	-5.62		
beta	I	2037-02-21T21:58:40.696		25.33	-45.87	45675.61	-4.15		
alpha	I	2037-02-21T22:03:31.027		24.72	-46.18	44690.03	-2.65		

No planet occultations

alpha	E	2037-02-21T22:19:32.537		22.59	-47.00	44697.78	2.64		
beta	E	2037-02-21T22:24:21.193		21.92	-47.18	45680.70	4.14		
eta	E	2037-02-21T22:29:27.317		21.20	-47.34	47176.12	5.60		
gamma	E	2037-02-21T22:30:45.260		21.01	-47.37	47626.30	5.95		
delta	E	2037-02-21T22:32:34.253		20.75	-47.42	48300.35	6.42		
lambda	E	2037-02-21T22:36:43.605		20.14	-47.51	50026.71	7.41		
epsilon	E	2037-02-21T22:38:32.207		19.88	-47.54	50853.61	7.89		