

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-02-21T04:16:14.710
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3413241369472480128
 2Mass ID (if available) : 04505398+2231506

ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50834s

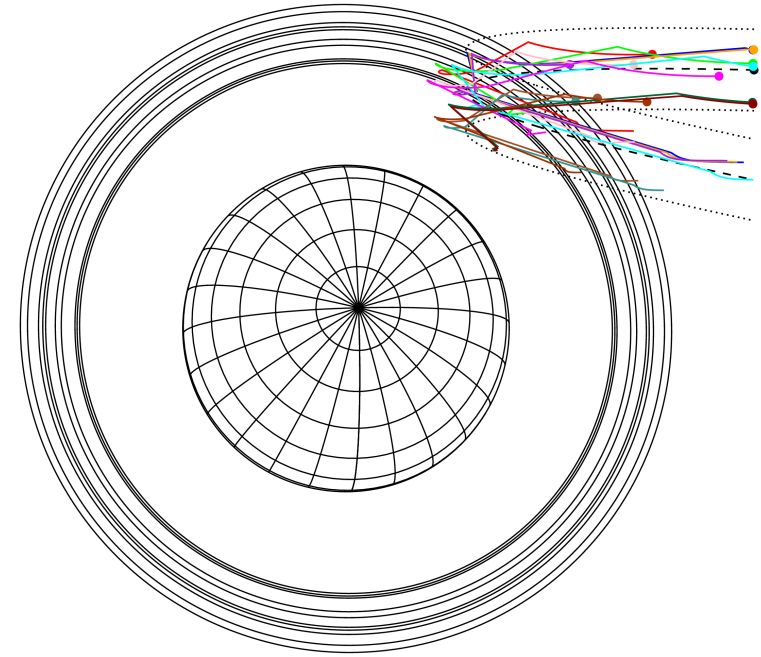
RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.826
 G magnitude : 15.760
 RP magnitude : 15.108
 BP magnitude : 16.231
 DUPflag : 0
 Distance (au) : 18.982
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 0.17
 Sun-Target sep (deg) : 101.93
 Sun-Moon sep (deg) : 116.26
 B (ring opening deg) : 81.46
 PA of pole (deg) : -31.32

#	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



2030-02-21T04:16:14.7100 ra: 04 50 53.9837 s: +22 31 50.508 C/A 2.9311 PA 151.59 deg v_sky + 0.17 km/s D 18.98 AU
 Credit: Styled after SORA/Lucky Star

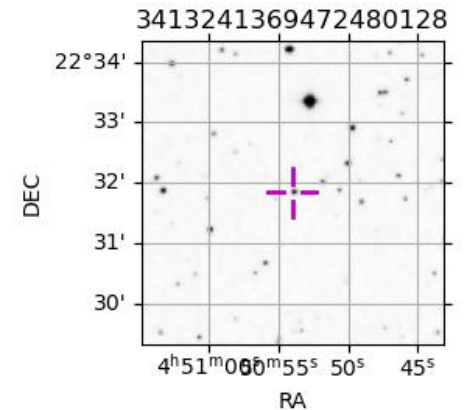
Uranus 2030-02-21T04:16:14 K13.83 G15.76 XRgt



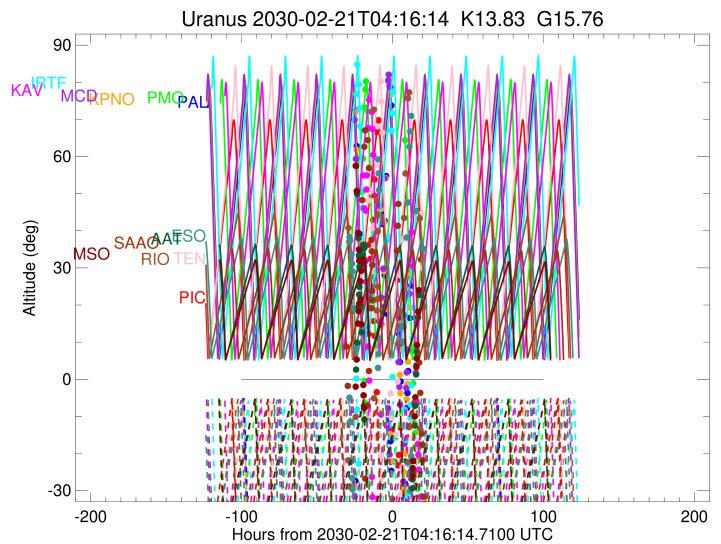
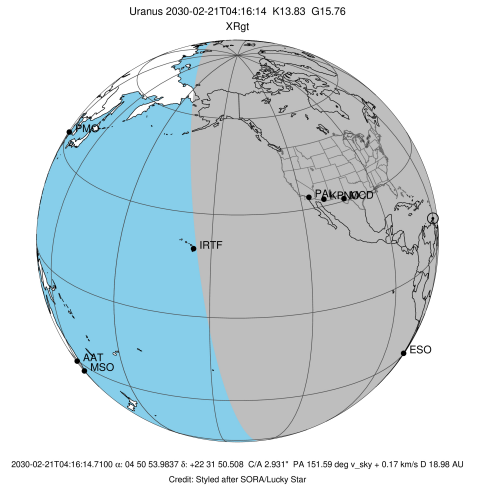
Earth
 PIC
 PAL
 PMO
 KPNO
 MCD
 TEN
 IRTF
 KAV
 RIO
 ESO
 AAT
 SAAO
 MSO

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	+		++	FEB 20 18:59 - FEB 21 23:10	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++	+++	++	FEB 20 03:37 - FEB 21 09:08	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		++	FEB 20 10:22 - FEB 21 17:10	PnnRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++	+++	+	FEB 20 03:23 - FEB 21 08:27	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++	+++	+	FEB 20 03:05 - FEB 21 08:12	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5		+++	+	FEB 20 20:31 - FEB 22 00:18	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++			FEB 20 04:55 - FEB 20 08:21	PnnRin
KAV	Kavalur Observatory	12.6	78.8		+++	++	FEB 20 14:38 - FEB 21 17:35	PnnRie
RIO	Rio de Janeiro	-22.9	316.8	+++++		+++	FEB 19 23:01 - FEB 22 02:08	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+	FEB 20 00:16 - FEB 22 00:37	PnnRie
AAT	Siding Spring (AAT)	-31.3	149.1		++		FEB 20 09:21 - FEB 20 09:38	PnnRin
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+			FEB 19 21:36 - FEB 19 21:36	PnnRin
MSO	Mt. Stromlo Observato	-35.3	149.0		+		FEB 20 09:30 - FEB 20 09:30	PnnRin



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-02-20T23:00:08.370
 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 : 3413241369472480128
 2Mass ID (if available) : 04505398+2231506
 ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50834s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.826
 G magnitude : 15.760
 RP magnitude : 15.108
 BP magnitude : 16.231
 DUPflag : 0
 Distance (au) : 18.978
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 0.17
 Sun-Target sep (deg) : 101.93
 Sun-Moon sep (deg) : 116.21
 B (ring opening deg) : 81.46
 PA of pole (deg) : -31.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.097
 C/A sky separation (km) : 42628.8
 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



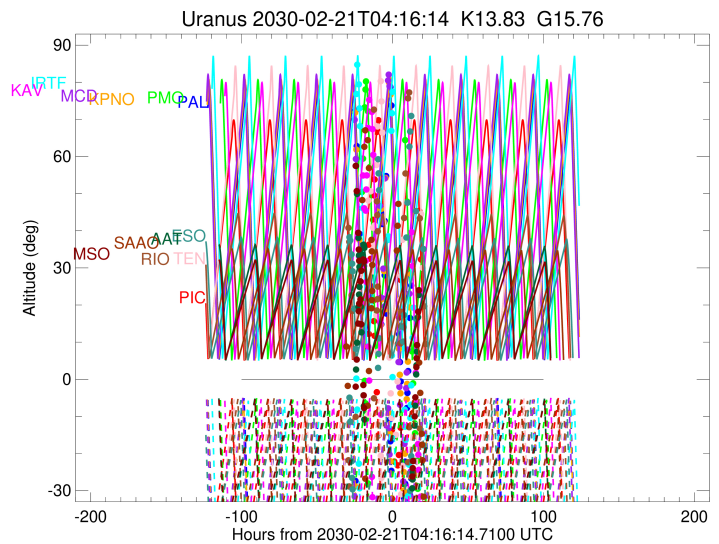
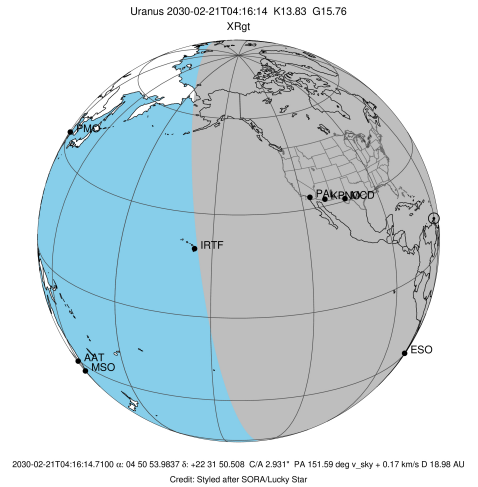
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-02-20T12:21:10.947		10.08	36.43x	51337.11	-0.23		
lambda	I	2030-02-20T13:46:40.755		25.26	32.36x	50026.71	-0.28		
delta	I	2030-02-20T15:23:58.072		43.11	21.03x	48300.35	-0.31		
gamma	I	2030-02-20T16:00:31.874		49.68	15.54x	47628.01	-0.31		
eta	I	2030-02-20T16:25:17.669		53.98	11.57x	47176.12	-0.30		
beta	I	2030-02-20T17:52:02.640		66.58	-3.44x	45680.49	-0.27		
alpha	I	2030-02-20T18:59:00.734		69.73	-15.64	44696.69	-0.22		

No planet occultations

alpha	E	2030-02-21T03:51:22.851		-13.10x	-32.87	44696.07	0.16		
beta	E	2030-02-21T05:28:32.716		-22.19x	-15.27	45680.48	0.18		
eta	E	2030-02-21T07:46:13.683		-23.26x	9.32x	47176.12	0.18		
gamma	E	2030-02-21T08:29:49.184		-20.50x	16.40x	47628.44	0.17		
delta	E	2030-02-21T09:41:27.364		-13.28x	26.52x	48300.35	0.14		
lambda	E	2030-02-21T21:56:50.035		45.56	-46.06	50026.71	0.21		
epsilon	E	2030-02-21T23:10:26.253		32.08	-54.78	51183.84	0.32		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-02-21T06:02:03.880
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3413241369472480128
 2Mass ID (if available) : 04505398+2231506
 ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50835s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.826
 G magnitude : 15.760
 RP magnitude : 15.108
 BP magnitude : 16.231
 DUPflag : 0
 Distance (au) : 18.983
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 0.17
 Sun-Target sep (deg) : 101.93
 Sun-Moon sep (deg) : 117.22
 B (ring opening deg) : 81.46
 PA of pole (deg) : -31.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.953
 C/A sky separation (km) : 40662.0
 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

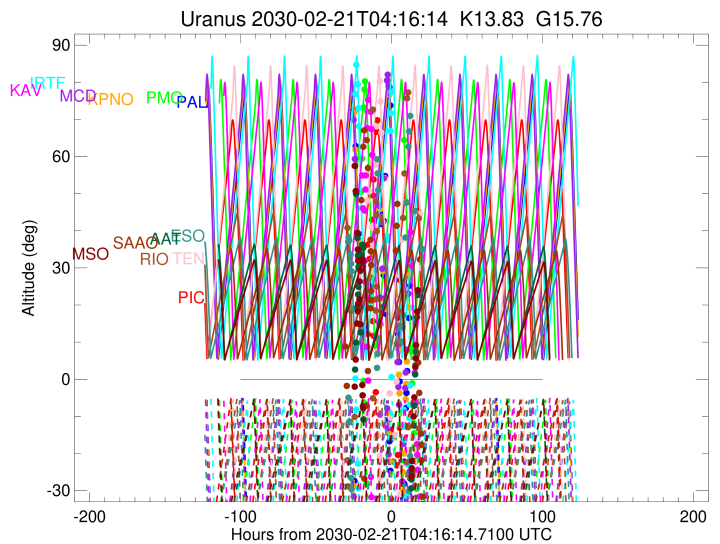
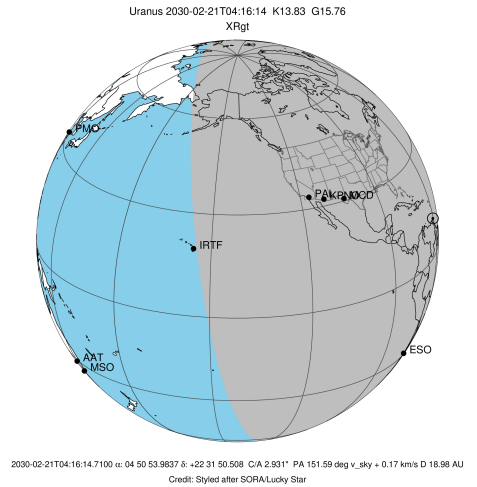


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-02-20T03:37:47.385		73.38	-26.10	51316.61	-0.43		
lambda	I	2030-02-20T04:34:06.985		62.66	-37.75	50026.71	-0.34		
delta	I	2030-02-20T06:28:29.796		38.85	-59.20	48300.35	-0.17		
gamma	I	2030-02-20T20:51:20.499		15.01	44.55x	47628.18	-0.21		
eta	I	2030-02-20T21:26:02.870		22.03	41.71x	47176.12	-0.23		
beta	I	2030-02-20T23:05:09.083		42.61	28.05x	45680.02	-0.27		
alpha	I	2030-02-21T00:05:10.697		55.18	17.32x	44699.36	-0.27		
4	I	2030-02-21T02:27:03.039		79.21	-11.16	42570.28	-0.21		
5	I	2030-02-21T02:58:34.420		78.27	-17.74	42200.86	-0.19		
6	I	2030-02-21T03:36:05.958		72.99	-25.59	41806.94	-0.15		

No planet occultations

6	E	2030-02-21T08:30:22.215		13.03	-66.33	41807.17	0.15		
5	E	2030-02-21T09:08:23.612		5.58	-62.53	42201.18	0.19		
4	E	2030-02-21T09:39:57.149		-0.39x	-57.89	42570.25	0.21		
alpha	E	2030-02-21T11:52:56.187		-22.26x	-32.39	44700.73	0.32		
beta	E	2030-02-21T12:41:58.560		-28.15x	-22.17	45679.43	0.35		
eta	E	2030-02-21T13:50:23.135		-33.28x	-7.88	47176.12	0.38		
gamma	E	2030-02-21T14:10:05.313		-33.95x	-3.80x	47628.90	0.39		
delta	E	2030-02-21T14:38:46.805		-34.23x	2.08x	48300.35	0.39		
lambda	E	2030-02-21T15:51:15.064		-31.25x	16.40x	50026.71	0.40		
epsilon	E	2030-02-21T16:42:29.310		-26.33x	25.77x	51234.41	0.39		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-02-21T13:18:48.650
 Event type : XRgt
 : No Uranus occs
 : 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 : 3413241369472480128
 2Mass ID (if available) : 04505398+2231506
 ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50835s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.826
 G magnitude : 15.760
 RP magnitude : 15.108
 BP magnitude : 16.231
 DUPflag : 0
 Distance (au) : 18.988
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 0.17
 Sun-Target sep (deg) : 101.93
 Sun-Moon sep (deg) : 115.97
 B (ring opening deg) : 81.46
 PA of pole (deg) : -31.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.053
 C/A sky separation (km) : 42047.4
 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

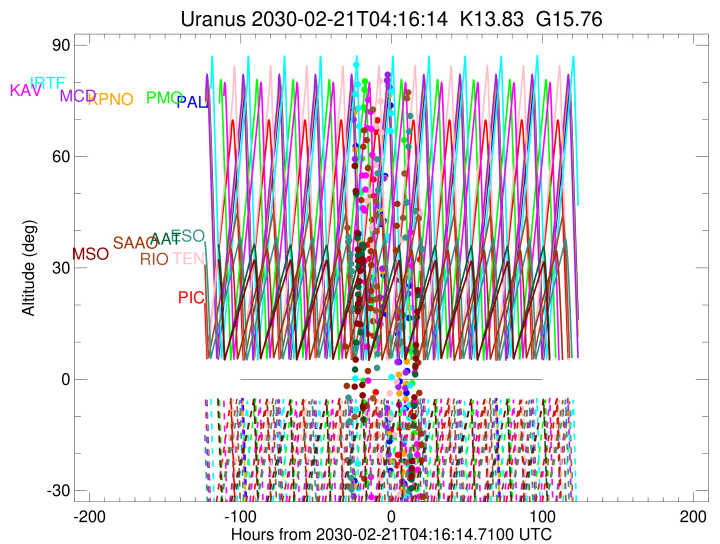
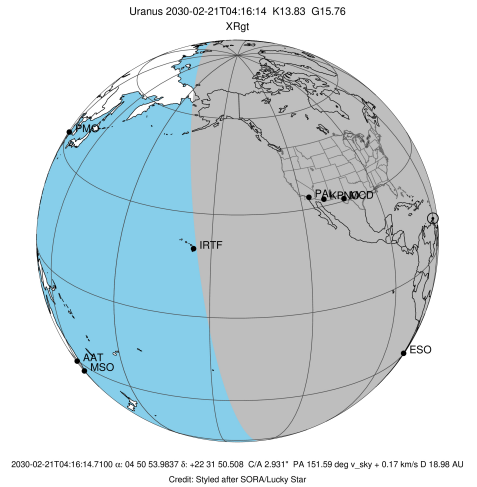


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-02-20T07:56:22.112		49.25	22.63x	51313.95	-0.45		
lambda	I	2030-02-20T08:45:04.434		59.56	13.34x	50026.71	-0.44		
delta	I	2030-02-20T09:53:45.143		73.37	-0.56x	48300.35	-0.40		
gamma	I	2030-02-20T10:22:45.122		78.14	-6.61	47628.10	-0.37		
eta	I	2030-02-20T10:43:25.840		80.28	-10.96	47176.12	-0.35		
beta	I	2030-02-20T12:03:53.513		72.21	-28.00	45680.54	-0.26		
alpha	I	2030-02-20T13:21:27.086		56.39	-44.14	44695.92	-0.16		
4	I	2030-02-21T12:47:56.598		62.59	-37.08	42562.73	-0.04		

No planet occultations

4	E	2030-02-21T13:49:13.445		49.66	-49.47	42562.53	0.04		
alpha	E	2030-02-21T17:10:27.431		7.79	-65.31	44705.15	0.32		
beta	E	2030-02-21T17:56:30.955		-1.11x	-58.71	45678.17	0.38		
eta	E	2030-02-21T18:55:31.168		-11.77x	-47.81	47176.12	0.46		
gamma	E	2030-02-21T19:11:32.572		-14.47x	-44.62	47629.37	0.48		
delta	E	2030-02-21T19:34:07.912		-18.11x	-40.02	48300.35	0.51		
lambda	E	2030-02-21T20:27:34.412		-25.73x	-28.84	50026.71	0.57		
epsilon	E	2030-02-21T21:01:28.208		-29.64x	-21.66	51212.34	0.60		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-02-21T05:42:50.170
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 3413241369472480128
 2Mass ID (if available) : 04505398+2231506
 ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50834s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.826
 G magnitude : 15.760
 RP magnitude : 15.108
 BP magnitude : 16.231
 DUPflag : 0
 Distance (au) : 18.983
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 0.17
 Sun-Target sep (deg) : 101.93
 Sun-Moon sep (deg) : 117.23
 B (ring opening deg) : 81.46
 PA of pole (deg) : -31.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.943
 C/A sky separation (km) : 40512.6
 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

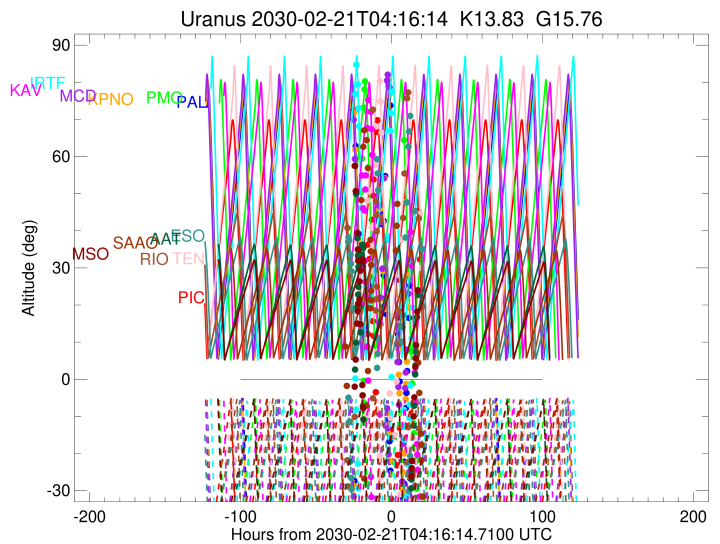
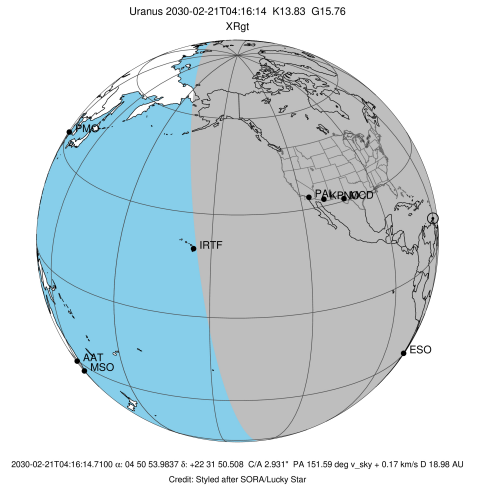


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-02-20T03:23:11.714		72.97	-27.56	51315.28	-0.43		
lambda	I	2030-02-20T04:19:13.611		61.73	-39.33	50026.71	-0.34		
delta	I	2030-02-20T06:14:33.452		37.26	-61.25	48300.35	-0.16		
gamma	I	2030-02-20T20:31:50.480		14.90	45.76x	47628.19	-0.21		
eta	I	2030-02-20T21:05:36.151		21.82	42.86x	47176.12	-0.23		
beta	I	2030-02-20T22:42:22.401		42.19	29.17x	45680.01	-0.27		
alpha	I	2030-02-20T23:40:58.636		54.66	18.51x	44699.36	-0.28		
4	I	2030-02-21T01:57:59.455		80.04	-9.34	42570.31	-0.22		
5	I	2030-02-21T02:27:41.589		80.35	-15.63	42200.91	-0.20		
6	I	2030-02-21T03:02:13.617		76.01	-22.96	41806.96	-0.17		

No planet occultations

6	E	2030-02-21T08:27:07.730		9.03	-66.07	41807.27	0.16		
5	E	2030-02-21T09:02:28.326		2.11x	-61.41	42201.40	0.20		
4	E	2030-02-21T09:32:30.780		-3.57x	-56.39	42570.38	0.22		
alpha	E	2030-02-21T11:42:34.068		-24.76x	-30.35	44700.68	0.32		
beta	E	2030-02-21T12:31:18.124		-30.41x	-20.01	45679.44	0.35		
eta	E	2030-02-21T13:39:44.084		-35.05x	-5.51	47176.12	0.38		
gamma	E	2030-02-21T13:59:32.280		-35.53x	-1.37x	47628.90	0.38		
delta	E	2030-02-21T14:28:27.224		-35.50x	4.62x	48300.35	0.39		
lambda	E	2030-02-21T15:41:57.721		-31.58x	19.23x	50026.71	0.39		
epsilon	E	2030-02-21T16:34:24.221		-25.91x	28.81x	51233.35	0.38		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-02-21T05:14:59.610
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 3413241369472480128
 2Mass ID (if available) : 04505398+2231506
 ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50834s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.826
 G magnitude : 15.760
 RP magnitude : 15.108
 BP magnitude : 16.231
 DUPflag : 0
 Distance (au) : 18.982
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 0.17
 Sun-Target sep (deg) : 101.93
 Sun-Moon sep (deg) : 117.22
 B (ring opening deg) : 81.46
 PA of pole (deg) : -31.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.933
 C/A sky separation (km) : 40384.6
 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

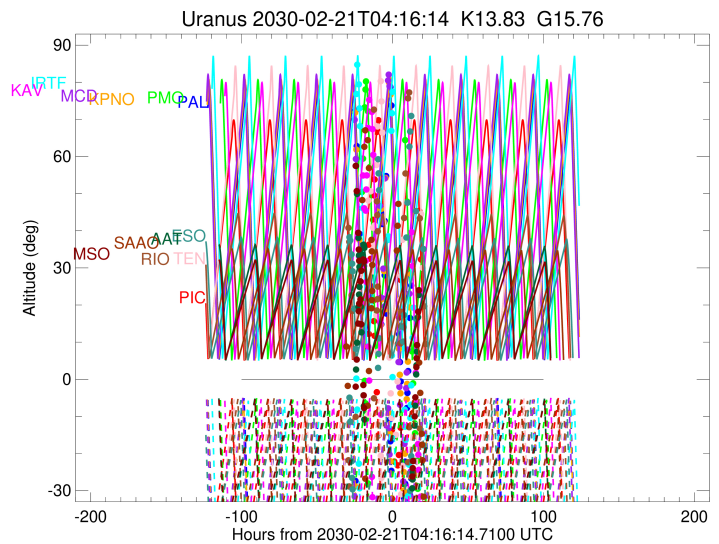
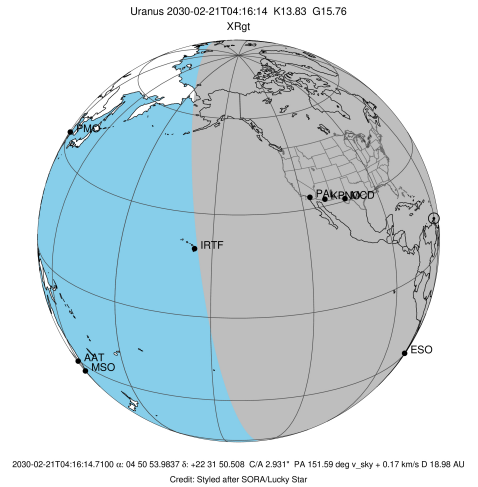


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-02-20T03:05:08.319		71.13	-30.28	51314.41	-0.43		
lambda	I	2030-02-20T04:01:54.186		59.20	-42.33	50026.71	-0.33		
delta	I	2030-02-20T06:04:33.102		32.79	-65.22	48300.35	-0.14		
gamma	I	2030-02-20T20:06:21.940		15.48	46.63x	47628.20	-0.22		
eta	I	2030-02-20T20:38:46.973		22.22	43.60x	47176.12	-0.24		
beta	I	2030-02-20T22:12:34.573		42.21	29.83x	45680.02	-0.28		
alpha	I	2030-02-20T23:09:37.639		54.52	19.27x	44699.33	-0.29		
4	I	2030-02-21T01:22:16.650		80.62	-8.04	42570.44	-0.23		
5	I	2030-02-21T01:50:33.792		81.95	-14.10	42201.13	-0.21		
6	I	2030-02-21T02:22:58.021		78.32	-21.07	41807.06	-0.18		

No planet occultations

6	E	2030-02-21T08:12:42.464		5.40	-65.20	41807.48	0.18		
5	E	2030-02-21T08:46:25.499		-1.19x	-59.91	42201.88	0.20		
4	E	2030-02-21T09:15:32.236		-6.68x	-54.58	42570.66	0.23		
alpha	E	2030-02-21T11:24:18.701		-27.34x	-27.90	44700.56	0.32		
beta	E	2030-02-21T12:13:16.190		-32.72x	-17.36	45679.47	0.35		
eta	E	2030-02-21T13:22:29.939		-36.69x	-2.54x	47176.12	0.37		
gamma	E	2030-02-21T13:42:38.821		-36.92x	1.71x	47628.89	0.38		
delta	E	2030-02-21T14:12:10.285		-36.44x	7.85x	48300.35	0.38		
lambda	E	2030-02-21T15:27:54.870		-31.19x	22.91x	50026.71	0.37		
epsilon	E	2030-02-21T16:22:43.738		-24.42x	32.76x	51232.20	0.36		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-02-20T23:49:10.530
 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 : 3413241369472480128
 2Mass ID (if available) : 04505398+2231506
 ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50834s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.826
 G magnitude : 15.760
 RP magnitude : 15.108
 BP magnitude : 16.231
 DUPflag : 0
 Distance (au) : 18.979
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 0.17
 Sun-Target sep (deg) : 101.93
 Sun-Moon sep (deg) : 116.31
 B (ring opening deg) : 81.46
 PA of pole (deg) : -31.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.966
 C/A sky separation (km) : 40820.2
 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



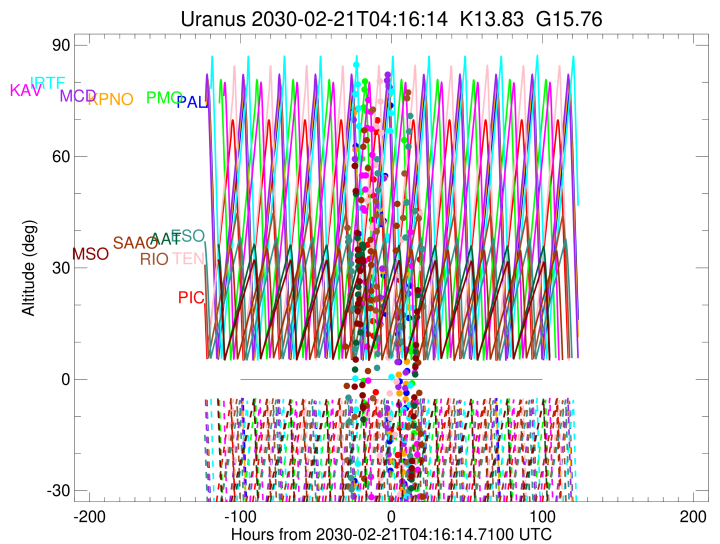
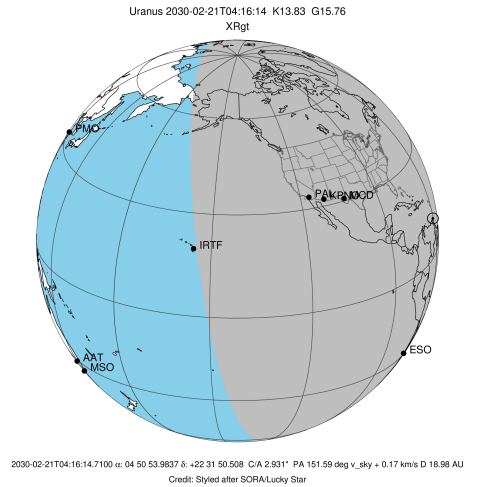
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-02-20T11:58:45.992	-12.71x	46.42x	51333.00	-0.15			
lambda	I	2030-02-20T13:45:31.865	8.16	50.59x	50026.71	-0.25			
delta	I	2030-02-20T15:25:04.874	29.26	40.68x	48300.35	-0.32			
gamma	I	2030-02-20T15:59:17.147	36.71	35.22x	47628.21	-0.33			
eta	I	2030-02-20T16:21:38.174	41.61	31.30x	47176.12	-0.34			
beta	I	2030-02-20T17:34:27.794	57.68	17.23x	45680.18	-0.34			
alpha	I	2030-02-20T18:23:42.914	68.51	6.99x	44698.35	-0.32			
4	I	2030-02-20T20:31:38.971	80.11	-20.81	42573.31	-0.22			
5	I	2030-02-20T21:02:25.581	73.88	-27.59	42206.28	-0.19			
6	I	2030-02-20T21:41:30.841	65.41	-36.17	41809.49	-0.14			

No planet occultations

6	E	2030-02-21T02:11:29.141	6.93	-68.64	41811.02	0.12			
5	E	2030-02-21T02:59:48.107	-2.77x	-60.68	42210.27	0.15			
4	E	2030-02-21T03:38:56.920	-10.26x	-52.94	42575.72	0.17			
alpha	E	2030-02-21T06:31:12.293	-35.52x	-15.53	44698.04	0.23			
beta	E	2030-02-21T07:39:45.717	-39.18x	-0.56x	45680.03	0.24			
eta	E	2030-02-21T09:23:55.653	-34.78x	21.22x	47176.12	0.23			
gamma	E	2030-02-21T09:57:23.457	-31.10x	27.74x	47628.71	0.22			
delta	E	2030-02-21T10:51:22.116	-23.51x	37.34x	48300.35	0.19			
lambda	E	2030-02-21T23:11:11.987	44.75	-55.02	50026.71	0.22			
epsilon	E	2030-02-22T00:18:31.023	30.02	-67.10	51164.65	0.34			

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch             : 2030-02-21T08:23:54.560
Event type            : XRgt
: No Uranus occs
: 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        : 3413241369472480128
2Mass ID (if available) : 04505398+2231506
ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50835s
RUWE (>1.4 is poor)  : 1.02
K magnitude           : 13.826
G magnitude           : 15.760
RP magnitude          : 15.108
BP magnitude          : 16.231
DUPflag              : 0
Distance (au)         : 18.985
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : 0.17
Sun-Target sep (deg)  : 101.93
Sun-Moon sep (deg)    : 117.02
B (ring opening deg)  : 81.46
PA of pole (deg)      : -31.32
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.854
C/A sky separation (km) : 39295.0
NAIF SPICE kernels    : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```

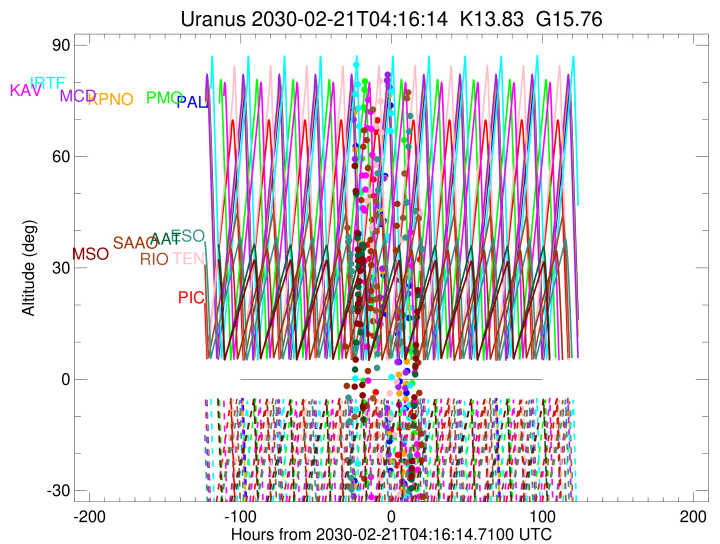
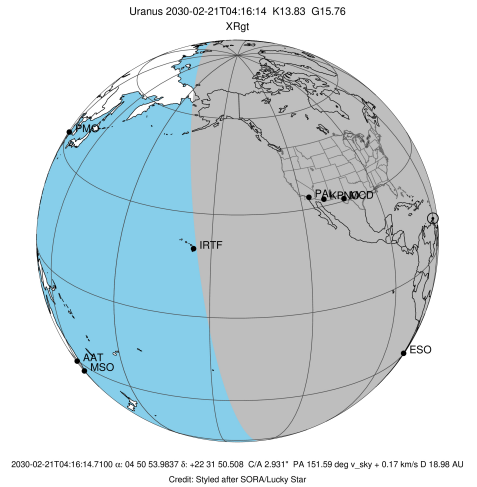


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-02-20T04:14:46.516		75.90	1.15x	51297.52	-0.54		
lambda	I	2030-02-20T04:55:28.323		84.83	-8.27	50026.71	-0.50		
delta	I	2030-02-20T05:57:56.270		79.30	-22.88	48300.35	-0.42		
gamma	I	2030-02-20T06:26:09.423		72.86	-29.51	47628.22	-0.38		
eta	I	2030-02-20T06:47:10.015		68.01	-34.45	47176.12	-0.34		
beta	I	2030-02-20T08:21:38.923		46.17	-56.58	45680.53	-0.19		
alpha	I	2030-02-21T01:26:32.493		38.00	38.13x	44700.98	-0.27		
4	I	2030-02-21T03:32:55.606		67.17	10.82x	42566.80	-0.28		
5	I	2030-02-21T03:56:12.213		72.54	5.51x	42195.10	-0.27		
6	I	2030-02-21T04:20:30.230		78.10	-0.08x	41804.50	-0.25		

No planet occultations

6	E	2030-02-21T12:19:08.338		-7.67x	-63.35	41804.29	0.28		
5	E	2030-02-21T12:40:27.023		-12.09x	-58.49	42194.08	0.31		
4	E	2030-02-21T13:00:17.397		-16.11x	-53.91	42565.79	0.33		
alpha	E	2030-02-21T14:34:48.802		-33.50x	-31.74	44703.26	0.42		
beta	E	2030-02-21T15:12:01.258		-39.08x	-22.98	45678.72	0.45		
eta	E	2030-02-21T16:05:06.811		-45.01x	-10.54	47176.12	0.49		
gamma	E	2030-02-21T16:20:29.807		-46.15x	-6.95	47629.19	0.49		
delta	E	2030-02-21T16:42:51.857		-47.27x	-1.76x	48300.35	0.50		
lambda	E	2030-02-21T17:38:53.310		-47.04x	11.10x	50026.71	0.52		
epsilon	E	2030-02-21T18:17:01.964		-44.46x	19.68x	51218.27	0.53		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-02-20T17:50:07.310
 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 : 3413241369472480128
 2Mass ID (if available) : 04505398+2231506
 ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50834s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.826
 G magnitude : 15.760
 RP magnitude : 15.108
 BP magnitude : 16.231
 DUPflag : 0
 Distance (au) : 18.974
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 0.17
 Sun-Target sep (deg) : 101.93
 Sun-Moon sep (deg) : 115.45
 B (ring opening deg) : 81.46
 PA of pole (deg) : -31.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.954
 C/A sky separation (km) : 40652.0
 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

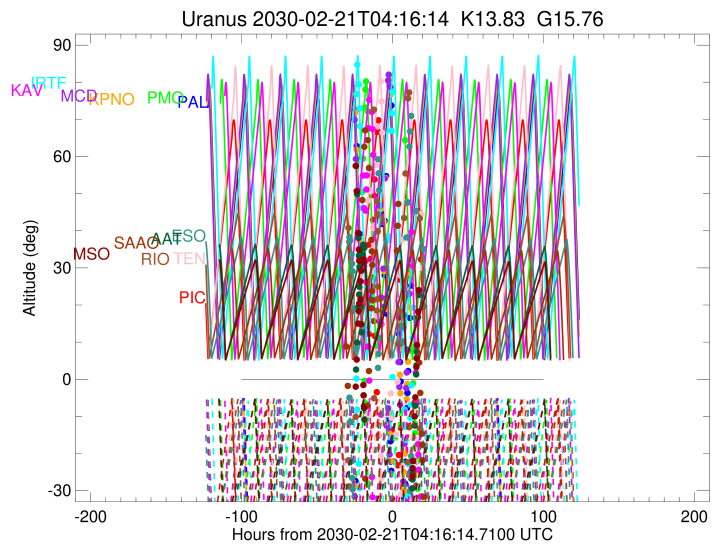
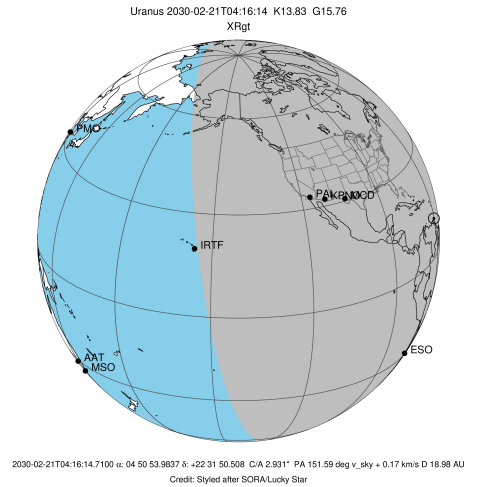


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-02-20T08:38:21.332		18.97	55.93x	51300.14	-0.40		
lambda	I	2030-02-20T09:28:55.371		30.65	45.94x	50026.71	-0.43		
delta	I	2030-02-20T10:33:22.777		45.55	31.76x	48300.35	-0.45		
gamma	I	2030-02-20T10:58:05.235		51.23	26.09x	47628.44	-0.45		
eta	I	2030-02-20T11:14:47.829		55.05	22.22x	47176.12	-0.45		
beta	I	2030-02-20T12:11:38.770		67.66	8.83x	45679.96	-0.42		
alpha	I	2030-02-20T12:51:37.790		75.50	-0.71x	44699.04	-0.39		
4	I	2030-02-20T14:38:21.204		71.88	-26.48	42572.85	-0.26		
5	I	2030-02-20T15:03:49.316		66.59	-32.66	42205.77	-0.23		
6	I	2030-02-20T15:35:14.402		59.67	-40.31	41809.39	-0.18		

No planet occultations

6	E	2030-02-20T20:33:29.427		-8.51x	-66.63	41812.56	0.13		
5	E	2030-02-21T16:46:16.280		42.53	-57.62	42181.49	0.09		
4	E	2030-02-21T17:35:31.871		31.14	-69.63	42557.29	0.17		
alpha	E	2030-02-21T19:42:32.301		2.00x	-78.92	44708.43	0.39		
beta	E	2030-02-21T20:20:18.771		-6.46x	-69.76	45677.04	0.46		
eta	E	2030-02-21T21:10:06.439		-17.34x	-57.62	47176.12	0.54		
gamma	E	2030-02-21T21:23:45.721		-20.25x	-54.28	47629.73	0.56		
delta	E	2030-02-21T21:43:02.720		-24.30x	-49.58	48300.35	0.59		
lambda	E	2030-02-21T22:28:50.619		-33.48x	-38.41	50026.71	0.66		
epsilon	E	2030-02-21T22:57:13.516		-38.76x	-31.49	51183.77	0.70		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-02-21T01:33:36.570
 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 : 3413241369472480128
 2Mass ID (if available) : 04505398+2231506
 ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50834s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.826
 G magnitude : 15.760
 RP magnitude : 15.108
 BP magnitude : 16.231
 DUPflag : 0
 Distance (au) : 18.980
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 0.17
 Sun-Target sep (deg) : 101.93
 Sun-Moon sep (deg) : 116.41
 B (ring opening deg) : 81.46
 PA of pole (deg) : -31.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.595
 C/A sky separation (km) : 35718.8
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.bsp
 ural61.bsp
 vgr2.ural61.bsp
 peph.ural60.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



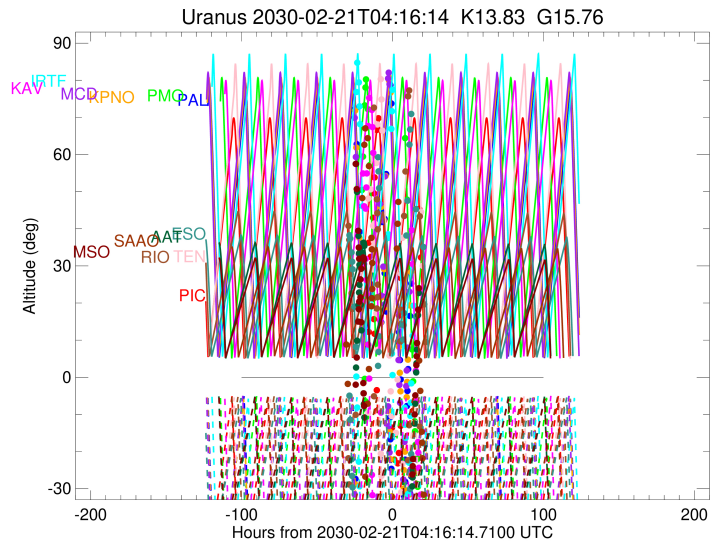
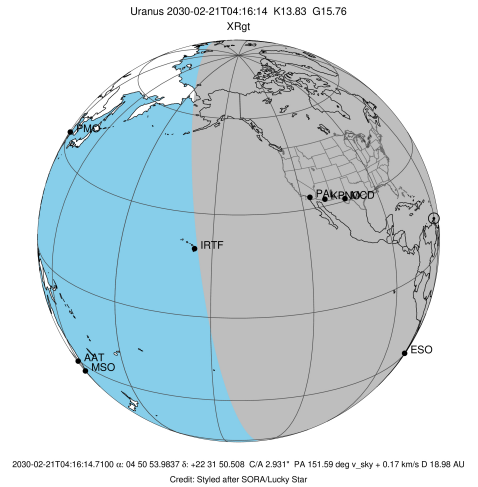
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-02-19T23:01:51.927		41.03	-21.25	51256.49	-0.59		
lambda	I	2030-02-19T23:38:54.678		36.96	-28.98	50026.71	-0.52		
delta	I	2030-02-20T00:41:02.355		27.73	-40.93	48300.35	-0.40		
gamma	I	2030-02-20T01:10:52.374		22.54	-45.95	47628.71	-0.35		
eta	I	2030-02-20T01:34:08.947		18.24	-49.39	47176.12	-0.30		
beta	I	2030-02-20T03:51:36.661		-9.95x	-54.56	45680.01	-0.07		
alpha	I	2030-02-20T16:01:02.043		-4.69x	72.28x	44701.51	-0.27		
4	I	2030-02-20T17:56:30.901		18.70	47.73x	42565.94	-0.34		
5	I	2030-02-20T18:14:54.462		22.10	43.53x	42193.75	-0.35		
6	I	2030-02-20T18:33:02.656		25.33	39.37x	41803.97	-0.35		

No planet occultations

6	E	2030-02-21T09:29:01.015		-87.42x	9.17x	41802.59	0.33		
5	E	2030-02-21T09:48:01.284		-88.17x	13.52x	42189.28	0.33		
4	E	2030-02-21T10:07:06.309		-83.77x	17.90x	42562.36	0.33		
alpha	E	2030-02-21T11:56:43.249		-58.48x	43.12x	44706.58	0.31		
beta	E	2030-02-21T12:51:15.476		-46.00x	55.45x	45677.40	0.28		
eta	E	2030-02-21T14:34:52.409		-22.64x	75.52x	47176.12	0.20		
gamma	E	2030-02-21T15:17:45.922		-13.19x	77.33x	47629.90	0.16		
delta	E	2030-02-21T22:17:22.653		43.66	-11.98	48300.35	0.04		
lambda	E	2030-02-22T01:18:01.836		19.79	-47.66	50026.71	0.31		
epsilon	E	2030-02-22T02:08:44.632		9.96	-54.12	51108.30	0.41		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-02-21T03:18:06.640
Event type          : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Observer code       : ESO
Location            : European Southern Obs. (3.6m)
Latitude (deg)      : -29.26097
E. Longitude (deg)  : 289.26831
Altitude (km)       : 2.400
Gaia source ID      : 3413241369472480128
2Mass ID (if available) : 04505398+2231506
ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50834s
RUWE (>1.4 is poor) : 1.02
K magnitude          : 13.826
G magnitude          : 15.760
RP magnitude         : 15.108
BP magnitude         : 16.231
DUPflag             : 0
Distance (au)       : 18.981
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : 0.17
Sun-Target sep (deg) : 101.93
Sun-Moon sep (deg)  : 116.68
B (ring opening deg) : 81.46
PA of pole (deg)    : -31.32
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.555
C/A sky separation (km) : 35169.0
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
ural11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ural11.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```

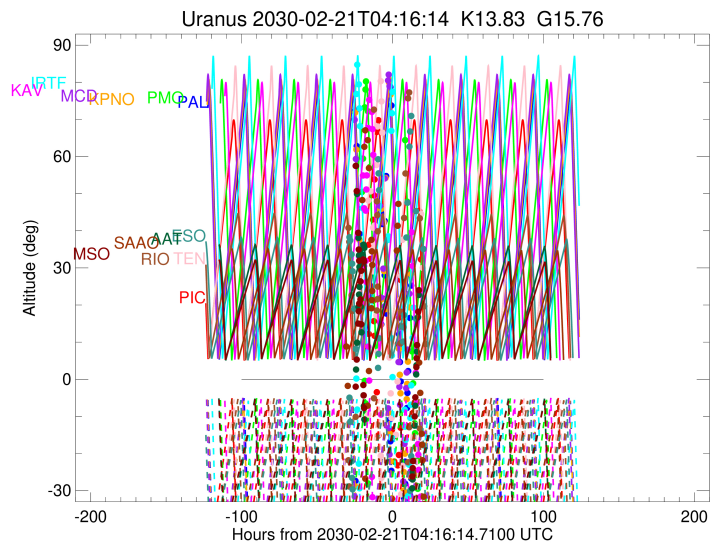
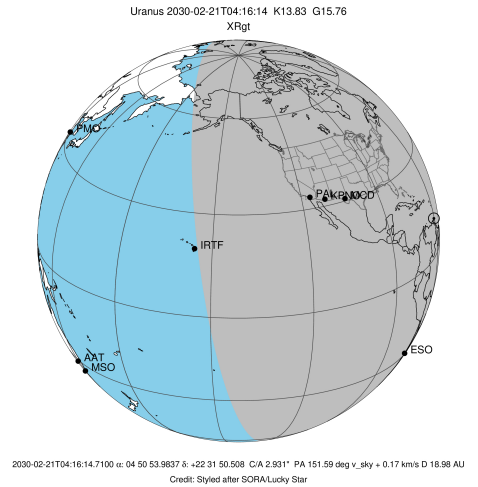


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-02-19T23:42:31.689		38.30	-4.47x	51249.41	-0.63		
lambda	I	2030-02-20T00:16:24.483		37.40	-11.54	50026.71	-0.58		
delta	I	2030-02-20T01:09:40.173		33.57	-22.21	48300.35	-0.50		
gamma	I	2030-02-20T01:33:00.832		31.08	-26.65	47628.88	-0.46		
eta	I	2030-02-20T01:49:58.085		29.01	-29.76	47176.12	-0.43		
beta	I	2030-02-20T02:57:17.287		19.05	-40.69	45679.45	-0.31		
alpha	I	2030-02-20T04:01:32.923		7.67	-47.84	44700.34	-0.20		
4	I	2030-02-20T18:43:08.777		3.30x	59.06x	42565.57	-0.28		
5	I	2030-02-20T19:05:25.655		7.54	54.75x	42192.99	-0.29		
6	I	2030-02-20T19:26:46.251		11.48	50.44x	41803.61	-0.30		

No planet occultations

6	E	2030-02-21T11:17:48.455		-82.93x	9.67x	41801.23	0.37		
5	E	2030-02-21T11:34:41.417		-83.38x	13.34x	42185.68	0.37		
4	E	2030-02-21T11:51:43.779		-81.83x	17.05x	42560.00	0.37		
alpha	E	2030-02-21T13:27:44.540		-62.70x	37.94x	44707.88	0.36		
beta	E	2030-02-21T14:13:04.461		-52.80x	47.55x	45677.00	0.35		
eta	E	2030-02-21T15:30:22.677		-35.92x	62.52x	47176.12	0.30		
gamma	E	2030-02-21T15:56:48.144		-30.21x	66.65x	47629.93	0.28		
delta	E	2030-02-21T16:40:18.646		-20.92x	70.89x	48300.35	0.24		
lambda	E	2030-02-21T19:47:14.526		15.80	45.96x	50026.71	0.08		
epsilon	E	2030-02-22T00:37:02.728		35.70	-16.20	51099.92	0.13		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-02-21T11:36:00.330
 Event type : XRgt
 : No Uranus occs
 : 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 : 3413241369472480128
 2Mass ID (if available) : 04505398+2231506
 ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50835s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.826
 G magnitude : 15.760
 RP magnitude : 15.108
 BP magnitude : 16.231
 DUPflag : 0
 Distance (au) : 18.987
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 0.17
 Sun-Target sep (deg) : 101.93
 Sun-Moon sep (deg) : 115.98
 B (ring opening deg) : 81.46
 PA of pole (deg) : -31.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.640
 C/A sky separation (km) : 36349.0
 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

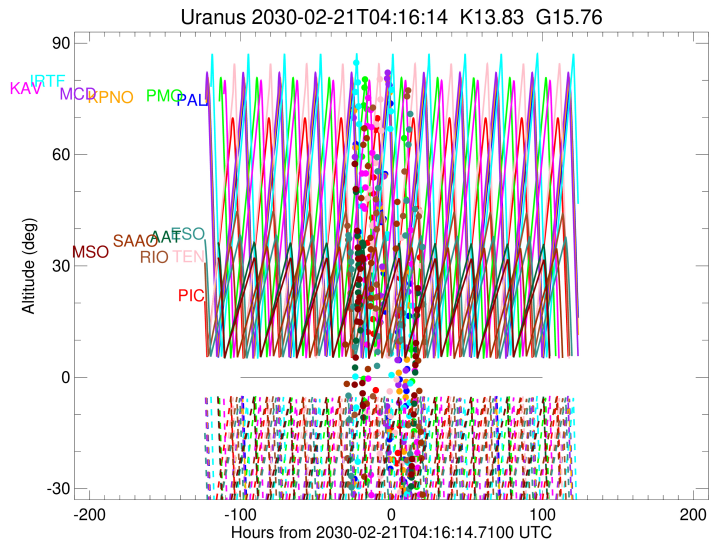
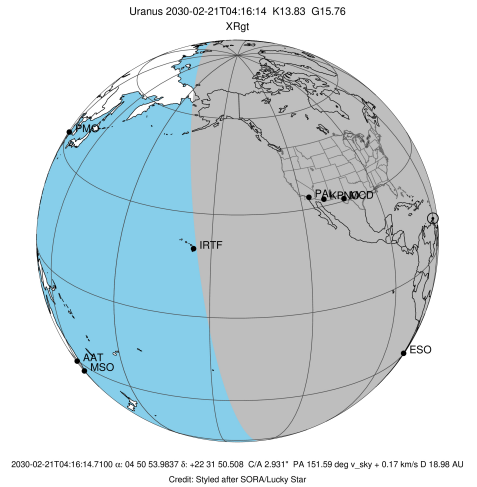


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-02-20T04:04:21.797		1.97x	58.07x	51258.62	-0.46		
lambda	I	2030-02-20T04:47:41.417		9.94	49.83x	50026.71	-0.49		
delta	I	2030-02-20T05:45:24.729		19.59	37.98x	48300.35	-0.51		
gamma	I	2030-02-20T06:07:26.349		22.89	33.32x	47628.95	-0.51		
eta	I	2030-02-20T06:22:16.731		24.96	30.16x	47176.12	-0.51		
beta	I	2030-02-20T07:11:51.200		30.86	19.56x	45679.04	-0.50		
alpha	I	2030-02-20T07:45:16.374		33.75	12.41x	44702.47	-0.48		
4	I	2030-02-20T09:05:34.021		36.25	-4.48x	42566.67	-0.40		
5	I	2030-02-20T09:21:35.824		35.93	-7.78	42195.47	-0.38		
6	I	2030-02-20T09:38:34.987		35.30	-11.22	41804.88	-0.36		

No planet occultations

6	E	2030-02-21T17:20:10.534		-42.91x	-29.68	41798.52	0.48		
5	E	2030-02-21T17:32:44.963		-45.60x	-27.46	42177.99	0.50		
4	E	2030-02-21T17:45:20.704		-48.31x	-25.19	42554.75	0.51		
alpha	E	2030-02-21T18:50:38.605		-62.25x	-12.60	44710.61	0.58		
beta	E	2030-02-21T19:17:39.532		-67.88x	-7.12	45676.15	0.61		
eta	E	2030-02-21T19:57:50.710		-75.72x	1.22x	47176.12	0.64		
gamma	E	2030-02-21T20:09:40.776		-77.73x	3.70x	47630.03	0.64		
delta	E	2030-02-21T20:26:56.455		-80.13x	7.35x	48300.35	0.65		
lambda	E	2030-02-21T21:10:32.428		-80.23x	16.64x	50026.71	0.67		
epsilon	E	2030-02-21T21:38:31.457		-76.07x	22.63x	51149.86	0.68		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-02-20T21:44:12.920
 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 : 3413241369472480128
 2Mass ID (if available) : 04505398+2231506
 ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50834s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.826
 G magnitude : 15.760
 RP magnitude : 15.108
 BP magnitude : 16.231
 DUPflag : 0
 Distance (au) : 18.977
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 0.17
 Sun-Target sep (deg) : 101.93
 Sun-Moon sep (deg) : 115.51
 B (ring opening deg) : 81.46
 PA of pole (deg) : -31.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.610
 C/A sky separation (km) : 35929.7
 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

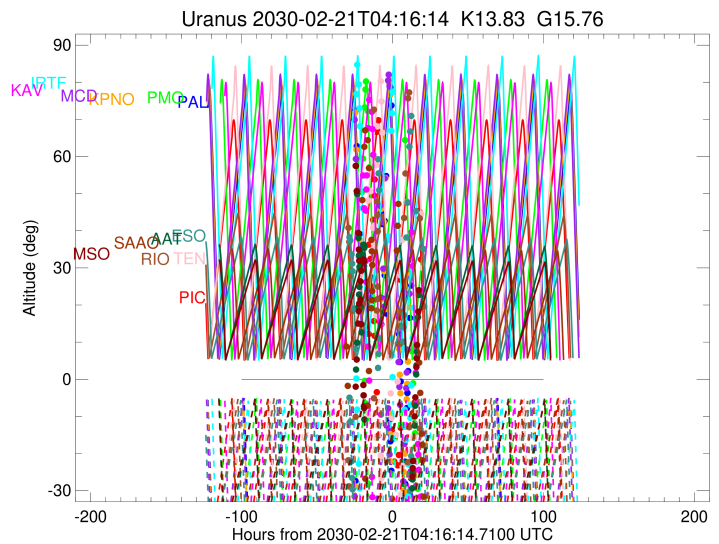
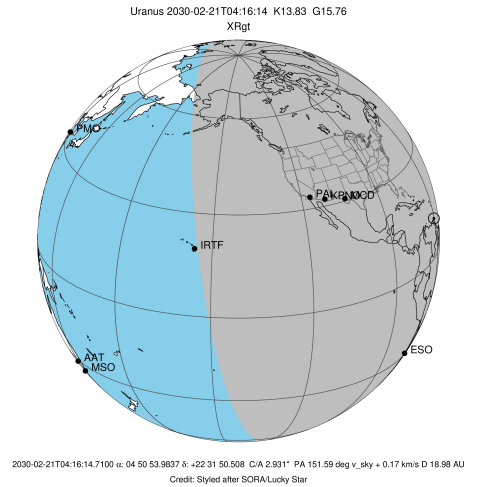


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-02-19T21:36:38.457		9.56	-43.31	51260.99	-0.39		
lambda	I	2030-02-19T22:39:20.252	-1.95x	-46.71	50026.71	-0.27			
delta	I	2030-02-20T08:17:00.321	-51.57x	48.76x	48300.35	-0.10			
gamma	I	2030-02-20T09:37:27.430	-34.54x	62.80x	47628.67	-0.18			
eta	I	2030-02-20T10:15:40.841	-26.53x	67.16x	47176.12	-0.22			
beta	I	2030-02-20T11:51:08.421	-7.16x	64.43x	45679.26	-0.30			
alpha	I	2030-02-20T12:41:38.066	2.51x	56.61x	44702.16	-0.34			
4	I	2030-02-20T14:19:54.044	19.26	37.38x	42565.70	-0.38			
5	I	2030-02-20T14:36:40.390	21.73	33.88x	42193.56	-0.38			
6	I	2030-02-20T14:53:26.932	24.05	30.37x	41803.96	-0.38			

No planet occultations

6	E	2030-02-21T07:04:47.008	-65.82x	33.90x	41802.31	0.21			
5	E	2030-02-21T07:35:11.850	-59.55x	40.19x	42188.03	0.20			
4	E	2030-02-21T08:08:05.317	-52.63x	46.81x	42561.13	0.19			
alpha	E	2030-02-21T21:56:04.289	4.68x	-45.58	44714.62	0.32			
beta	E	2030-02-21T22:40:18.646	-3.65x	-47.45	45674.55	0.40			
eta	E	2030-02-21T23:35:33.753	-14.58x	-46.17	47176.12	0.50			
gamma	E	2030-02-21T23:50:12.400	-17.55x	-45.18	47630.37	0.53			
delta	E	2030-02-22T00:10:33.435	-21.72x	-43.41	48300.35	0.57			
lambda	E	2030-02-22T00:57:50.676	-31.56x	-37.75	50026.71	0.65			
epsilon	E	2030-02-22T01:25:00.638	-37.28x	-33.73	51121.41	0.70			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-02-21T11:32:05.600
 Event type : XRgt
 : No Uranus occs
 : 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 : 3413241369472480128
 2Mass ID (if available) : 04505398+2231506
 ICRS Star Coord at Epoch: 04h 50m 53.98374s +22:31:50.50835s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.826
 G magnitude : 15.760
 RP magnitude : 15.108
 BP magnitude : 16.231
 DUPflag : 0
 Distance (au) : 18.987
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 0.17
 Sun-Target sep (deg) : 101.93
 Sun-Moon sep (deg) : 115.96
 B (ring opening deg) : 81.46
 PA of pole (deg) : -31.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.632
 C/A sky separation (km) : 36240.6
 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_itrff93_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	2030-02-20T03:49:40.661	-2.65x	58.01x	51256.86	-0.44			
lambda	I	2030-02-20T04:34:39.704	5.40	50.60x	50026.71	-0.47			
delta	I	2030-02-20T05:34:13.466	15.08	39.36x	48300.35	-0.49			
gamma	I	2030-02-20T05:56:49.985	18.38	34.87x	47628.98	-0.50			
eta	I	2030-02-20T06:12:01.871	20.45	31.81x	47176.12	-0.50			
beta	I	2030-02-20T07:02:36.057	26.37	21.52x	45678.97	-0.49			
alpha	I	2030-02-20T07:36:29.981	29.32	14.59x	44702.69	-0.47			
4	I	2030-02-20T08:57:16.475	32.28	-1.71x	42566.25	-0.40			
5	I	2030-02-20T09:13:14.875	32.12	-4.86x	42194.79	-0.39			
6	I	2030-02-20T09:30:04.504	31.69	-8.13	41804.60	-0.37			

No planet occultations

6	E	2030-02-21T17:25:12.948	-43.97x	-26.48	41798.28	0.48			
5	E	2030-02-21T17:37:48.779	-46.55x	-24.38	42177.23	0.50			
4	E	2030-02-21T17:50:27.508	-49.13x	-22.21	42554.17	0.51			
alpha	E	2030-02-21T18:56:10.231	-62.29x	-10.16	44711.05	0.58			
beta	E	2030-02-21T19:23:23.233	-67.40x	-4.88x	45675.97	0.60			
eta	E	2030-02-21T20:03:57.635	-73.98x	3.18x	47176.12	0.63			
gamma	E	2030-02-21T20:15:55.268	-75.46x	5.59x	47630.07	0.64			
delta	E	2030-02-21T20:33:22.384	-76.96x	9.13x	48300.35	0.64			
lambda	E	2030-02-21T21:17:30.427	-76.01x	18.13x	50026.71	0.66			
epsilon	E	2030-02-21T21:45:44.892	-72.41x	23.89x	51145.01	0.67			