

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-04-13T23:48:14.250
 Event type : PRgt
 : Uranus occs: not geocentric or topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3415735847823663104
 2Mass ID (if available) : 05134196+2306530

ICRS Star Coord at Epoch: 05h 13m 41.95945s +23:06:53.05479s

RUWE (>1.4 is poor) : 1.13
 K magnitude : 14.222
 G magnitude : 16.708
 RP magnitude : 15.916
 BP magnitude : 17.341
 DUPflag : 0
 Distance (au) : 19.676
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.00
 Sun-Target sep (deg) : 55.95
 Sun-Moon sep (deg) : 152.90
 B (ring opening deg) : 81.99
 PA of pole (deg) : 7.74

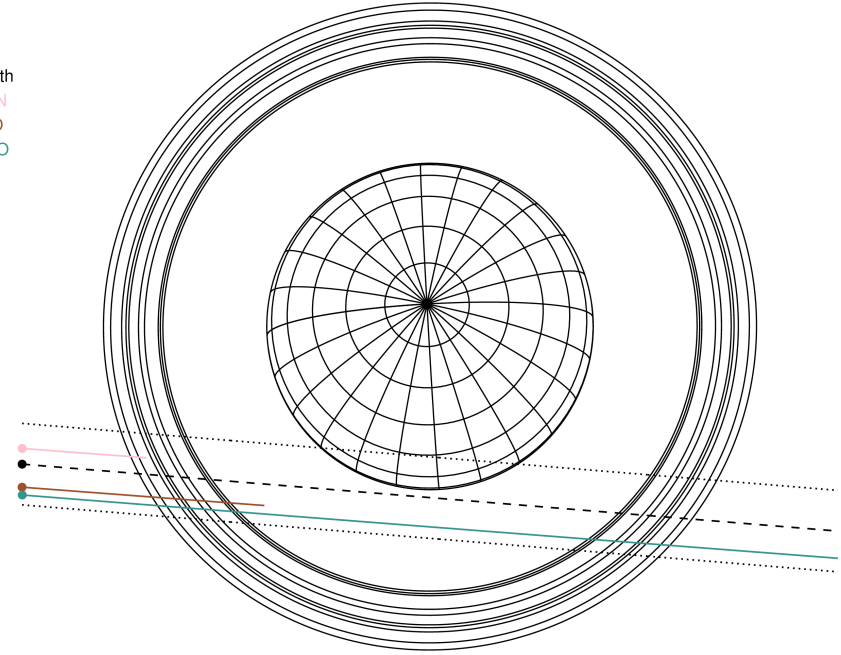
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2031-04-13T23:48:14.2500 ex: 05 13 41.9595 s: +23 06 53.055 C/A 1.867° PA 355.31 deg v_sky +23.00 km/s D 19.68 AU
 Credit: Styled after SORA/Lucky Star

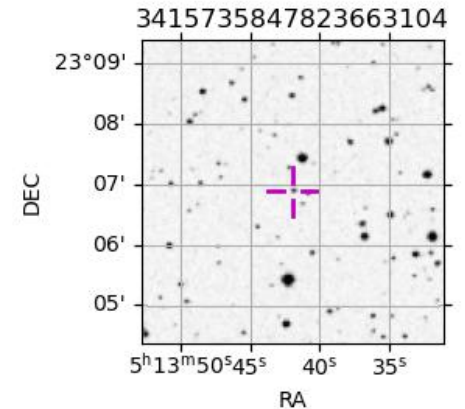
Uranus 2031-04-13T23:48:14 K14.22 G16.71 PRgt

Earth
 TEN
 RIO
 ESO



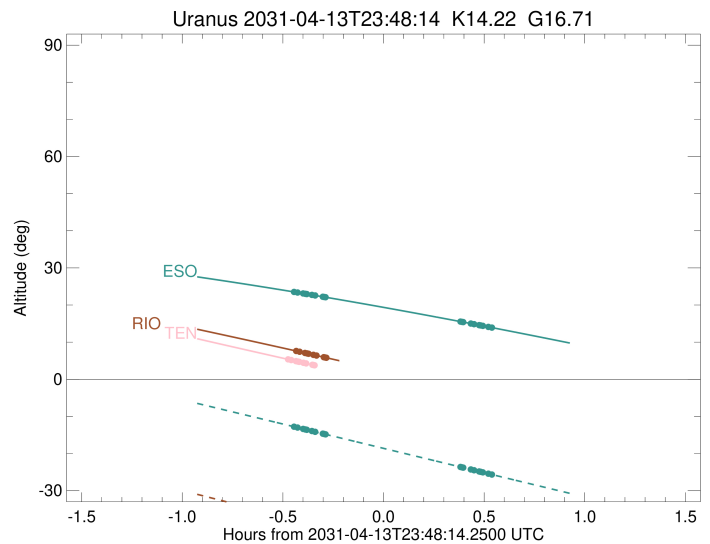
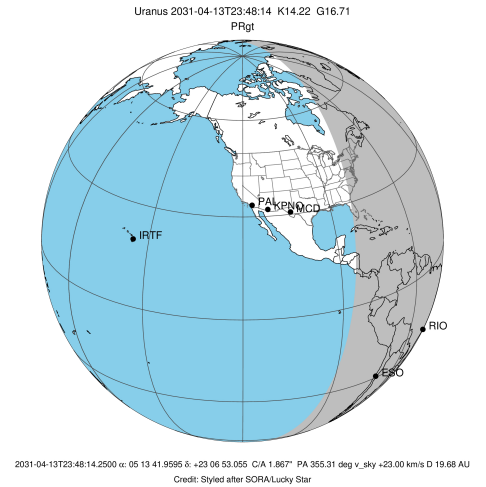
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	++			APR 13 23:20 - APR 13 23:20	PnnRin
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++			APR 13 23:22 - APR 13 23:31	PnnRin
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	APR 13 23:21 - APR 14 00:20	PnnRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



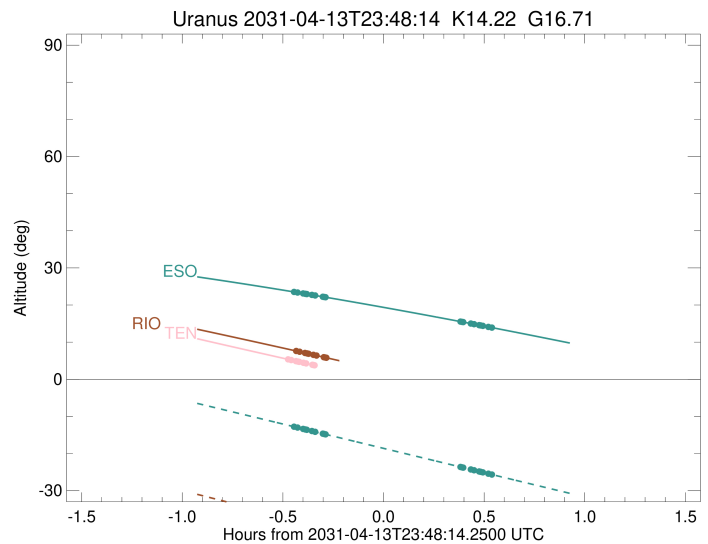
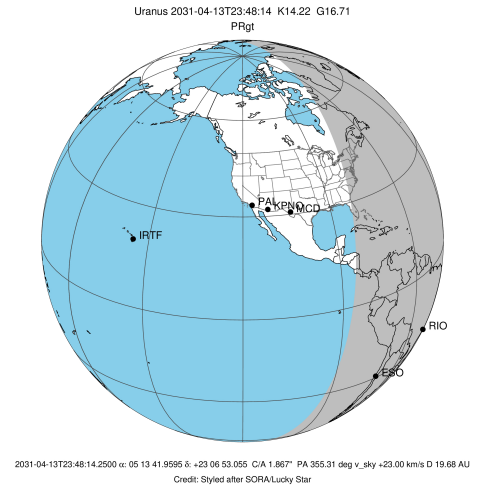
3415735847823663104

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-04-13T23:52:28.680
 Event type : PRgt
 : Uranus occs: not geocentric or 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 : 3415735847823663104
 2Mass ID (if available) : 05134196+2306530
 ICRS Star Coord at Epoch: 05h 13m 41.95945s +23:06:53.05479s
 RUWE (>1.4 is poor) : 1.13
 K magnitude : 14.222
 G magnitude : 16.708
 RP magnitude : 15.916
 BP magnitude : 17.341
 DUPflag : 0
 Distance (au) : 19.676
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.00
 Sun-Target sep (deg) : 55.95
 Sun-Moon sep (deg) : 152.18
 B (ring opening deg) : 81.99
 PA of pole (deg) : 7.74
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.669
 C/A sky separation (km) : 23823.3
 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	2031-04-13T23:20:00.672		5.32	-44.62	50898.23	-20.36		
lambda	I	2031-04-13T23:20:43.723		5.17	-44.72	50026.71	-20.19		
delta	I	2031-04-13T23:22:09.678		4.88x	-44.92	48300.35	-19.97		
gamma	I	2031-04-13T23:22:43.752		4.77x	-44.99	47621.39	-19.88		
eta	I	2031-04-13T23:23:06.188		4.69x	-45.04	47176.12	-19.81		
beta	I	2031-04-13T23:24:22.068		4.44x	-45.21	45681.23	-19.58		
alpha	I	2031-04-13T23:25:11.149		4.27x	-45.32	44724.44	-19.41		
4	I	2031-04-13T23:27:01.653		3.90x	-45.56	42598.89	-19.00		
5	I	2031-04-13T23:27:16.730		3.85x	-45.59	42315.18	-18.95		
6	I	2031-04-13T23:27:40.715		3.77x	-45.65	41858.11	-18.87		
Uranus	I	2031-04-13T23:46:42.321		-0.03x	-47.94	25129.47		-6.89	-7.21
Uranus	E	2031-04-13T23:57:55.352		-2.24x	-49.11	24989.71		-7.97	-8.34
6	E	2031-04-14T00:17:05.115		-5.94x	-50.75	41864.99	18.95		
5	E	2031-04-14T00:17:23.385		-6.00x	-50.77	42210.01	19.04		
4	E	2031-04-14T00:17:40.196		-6.05x	-50.79	42527.81	19.09		
alpha	E	2031-04-14T00:19:31.940		-6.41x	-50.92	44685.72	19.51		
beta	E	2031-04-14T00:20:21.282		-6.56x	-50.98	45652.37	19.68		
eta	E	2031-04-14T00:21:38.264		-6.81x	-51.07	47176.12	19.92		
gamma	E	2031-04-14T00:22:01.038		-6.88x	-51.09	47630.48	19.98		
delta	E	2031-04-14T00:22:34.477		-6.98x	-51.13	48300.35	20.08		
lambda	E	2031-04-14T00:23:59.962		-7.25x	-51.22	50026.71	20.31		
epsilon	E	2031-04-14T00:25:14.853		-7.49x	-51.30	51554.31	20.48		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-04-13T23:52:22.990
 Event type : PRgt
 : Uranus occs: not geocentric or 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 : 3415735847823663104
 2Mass ID (if available) : 05134196+2306530
 ICRS Star Coord at Epoch: 05h 13m 41.95945s +23:06:53.05479s
 RUWE (>1.4 is poor) : 1.13
 K magnitude : 14.222
 G magnitude : 16.708
 RP magnitude : 15.916
 BP magnitude : 17.341
 DUPflag : 0
 Distance (au) : 19.676
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.00
 Sun-Target sep (deg) : 55.95
 Sun-Moon sep (deg) : 152.11
 B (ring opening deg) : 81.99
 PA of pole (deg) : 7.74
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.096
 C/A sky separation (km) : 29904.0
 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

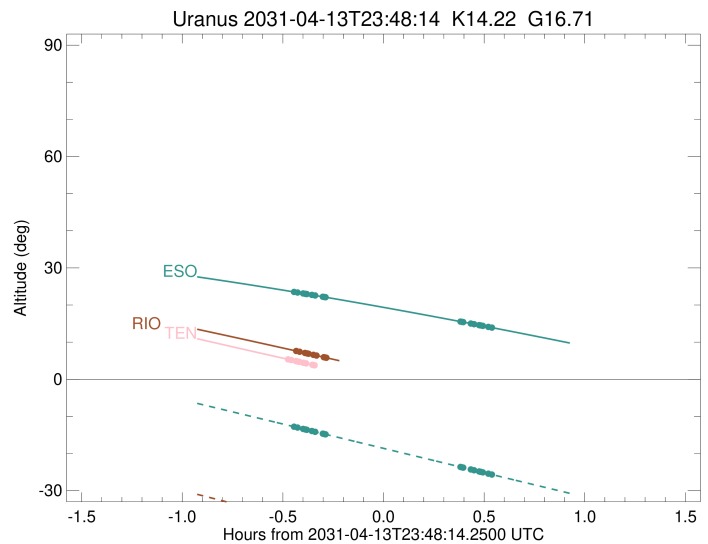
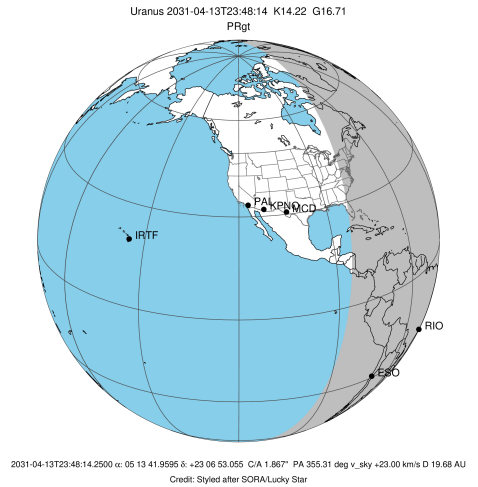


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-04-13T23:22:24.310		7.58	-37.83	50945.54	-18.49		
lambda	I	2031-04-13T23:23:14.516		7.41	-38.02	50026.71	-18.21		
delta	I	2031-04-13T23:24:50.315		7.09	-38.39	48300.35	-17.83		
gamma	I	2031-04-13T23:25:28.555		6.96	-38.53	47621.78	-17.66		
eta	I	2031-04-13T23:25:53.867		6.87	-38.63	47176.12	-17.55		
beta	I	2031-04-13T23:27:20.049		6.58	-38.96	45680.98	-17.14		
alpha	I	2031-04-13T23:28:16.708		6.39	-39.18	44718.60	-16.84		
4	I	2031-04-13T23:30:25.543		5.95	-39.67	42591.71	-16.10		
5	I	2031-04-13T23:30:43.073		5.89	-39.73	42314.38	-16.00		
6	I	2031-04-13T23:31:10.989		5.80	-39.84	41864.82	-15.84		

No planet occultations

6	E	2031-04-14T00:13:21.926		-2.97x	-49.42	41870.67	15.90		
5	E	2031-04-14T00:13:44.144		-3.05x	-49.51	42224.88	16.06		
4	E	2031-04-14T00:14:03.421		-3.11x	-49.58	42530.98	16.16		
alpha	E	2031-04-14T00:16:13.482		-3.57x	-50.07	44684.73	16.91		
beta	E	2031-04-14T00:17:10.385		-3.77x	-50.28	45655.51	17.22		
eta	E	2031-04-14T00:18:37.662		-4.08x	-50.61	47176.12	17.64		
gamma	E	2031-04-14T00:19:03.309		-4.17x	-50.70	47629.93	17.75		
delta	E	2031-04-14T00:19:40.898		-4.31x	-50.84	48300.35	17.92		
lambda	E	2031-04-14T00:21:16.196		-4.64x	-51.20	50026.71	18.31		
epsilon	E	2031-04-14T00:22:38.507		-4.94x	-51.51	51546.29	18.59		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-04-13T23:51:11.160
 Event type : PRgt
 : Uranus occs: not geocentric or topocentric
 : 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 : 3415735847823663104
 2Mass ID (if available) : 05134196+2306530
 ICRS Star Coord at Epoch: 05h 13m 41.95945s +23:06:53.05479s
 RUWE (>1.4 is poor) : 1.13
 K magnitude : 14.222
 G magnitude : 16.708
 RP magnitude : 15.916
 BP magnitude : 17.341
 DUPflag : 0
 Distance (au) : 19.676
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.00
 Sun-Target sep (deg) : 55.95
 Sun-Moon sep (deg) : 152.43
 B (ring opening deg) : 81.99
 PA of pole (deg) : 7.74
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.192
 C/A sky separation (km) : 31287.6
 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



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	2031-04-13T23:21:45.591		23.50	-12.82	50956.74	-17.90		
lambda	I	2031-04-13T23:22:38.154		23.37	-13.02	50026.71	-17.59		
delta	I	2031-04-13T23:24:17.498		23.12	-13.38	48300.35	-17.16		
gamma	I	2031-04-13T23:24:57.249		23.02	-13.52	47621.88	-16.98		
eta	I	2031-04-13T23:25:23.607		22.95	-13.62	47176.12	-16.85		
beta	I	2031-04-13T23:26:53.570		22.72	-13.94	45680.84	-16.39		
alpha	I	2031-04-13T23:27:53.012		22.57	-14.16	44717.22	-16.04		
4	I	2031-04-13T23:30:08.811		22.23	-14.65	42589.86	-15.20		
5	I	2031-04-13T23:30:27.334		22.18	-14.72	42313.75	-15.08		
6	I	2031-04-13T23:30:56.808		22.10	-14.83	41866.31	-14.90		

No planet occultations

6	E	2031-04-14T00:11:12.506		15.54	-23.63	41871.98	14.95		
5	E	2031-04-14T00:11:36.277		15.47	-23.71	42228.92	15.13		
4	E	2031-04-14T00:11:56.567		15.41	-23.79	42532.07	15.25		
alpha	E	2031-04-14T00:14:13.722		15.02	-24.29	44684.64	16.10		
beta	E	2031-04-14T00:15:13.474		14.84	-24.51	45656.36	16.44		
eta	E	2031-04-14T00:16:44.633		14.58	-24.84	47176.12	16.91		
gamma	E	2031-04-14T00:17:11.356		14.50	-24.93	47629.77	17.04		
delta	E	2031-04-14T00:17:50.494		14.39	-25.08	48300.35	17.23		
lambda	E	2031-04-14T00:19:29.446		14.10	-25.44	50026.71	17.66		
epsilon	E	2031-04-14T00:20:54.475		13.85	-25.75	51542.94	17.97		