

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2047-01-04T11:05:33.810
 Event type : PgtX
 : Uranus occs: geocentric, topocentric
 : No ring occs
 Gaia source ID : 3882161810040368896
 2Mass ID (if available) : 10301957+1013566

ICRS Star Coord at Epoch: 10h 30m 19.57548s +10:13:56.41358s

RUWE (>1.4 is poor) : 0.90
 K magnitude : 14.792
 G magnitude : 17.963
 RP magnitude : 16.930
 BP magnitude : 19.003
 DUPflag : 0
 Distance (au) : 17.697
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -11.49
 Sun-Target sep (deg) : 127.86
 Sun-Moon sep (deg) : 139.23
 B (ring opening deg) : 11.95
 PA of pole (deg) : 103.51

a(km) ring

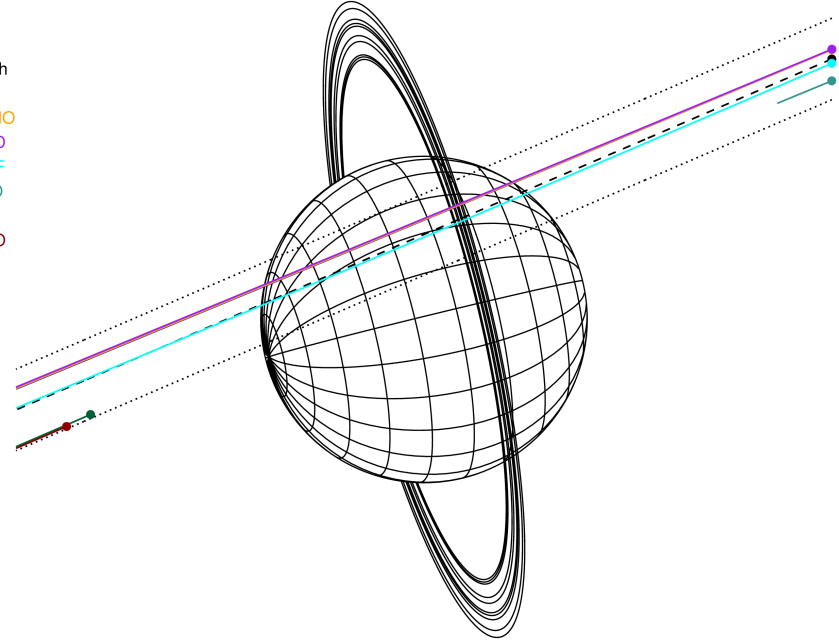
- 1 41837.2 6
- 2 42235.0 5
- 3 42571.2 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.1 eta
- 7 47626.3 gamma
- 8 48300.3 delta
- 9 50026.7 lambda
- 10 51149.4 epsilon



2047-01-04T11:05:33.8100 cc: 10 30 19.5755 s; +10 13 56.414 C/A 0.970° PA 203.27 deg v_sky -11.49 km/s D 17.70 AU
 Credit: Styled after SORA/Lucky Star

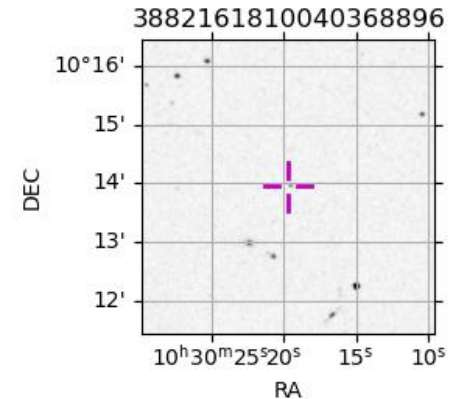
Uranus 2047-01-04T11:05:33 K14.79 G17.96 PgtX

Earth
 PAL
 KPNO
 MCD
 IRTF
 ESO
 AAT
 MSO

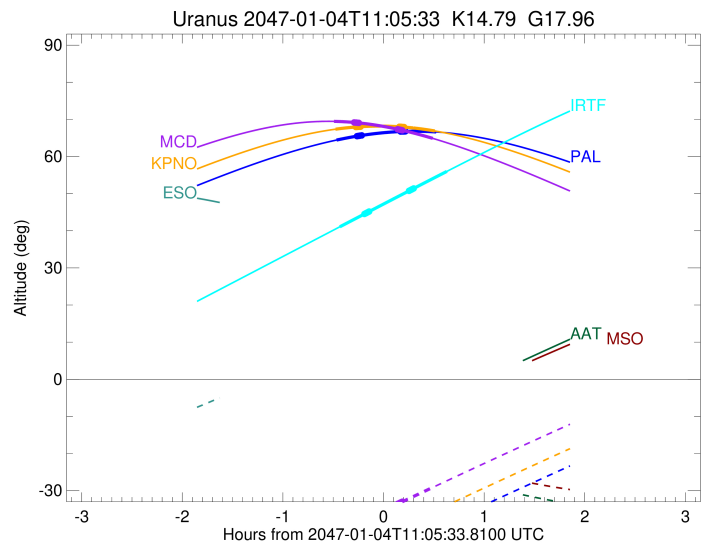
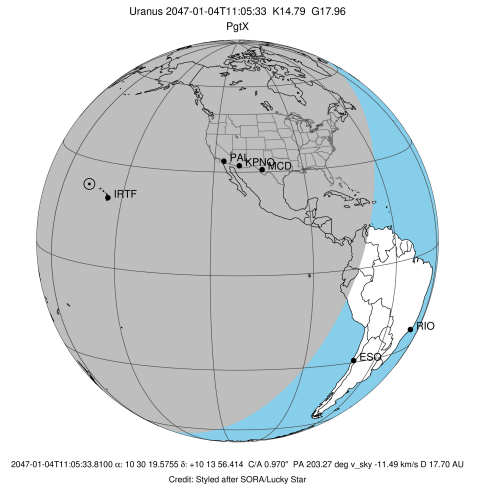


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1		+	+	JAN 04 10:37 - JAN 04 11:36	PieRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4		+	+	JAN 04 10:36 - JAN 04 11:36	PieRnn
MCD	McDonald Obs. 2.7m	30.7	256.0		+	+	JAN 04 10:36 - JAN 04 11:34	PieRnn
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5		+	+	JAN 04 10:39 - JAN 04 11:43	PieRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
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					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

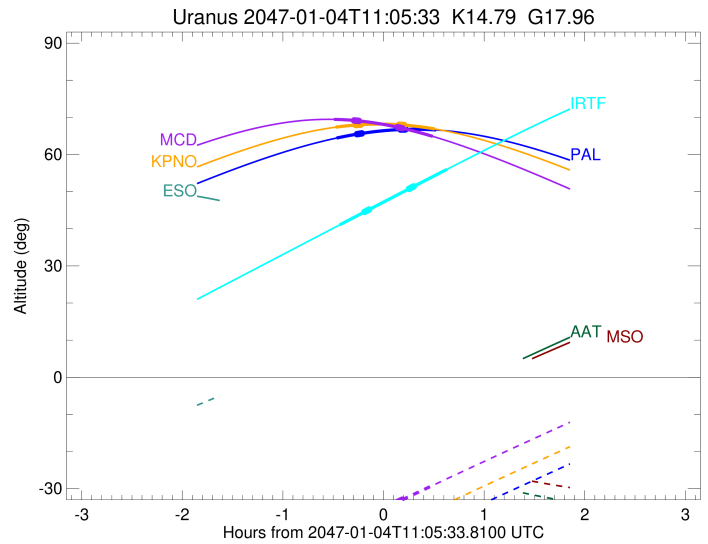
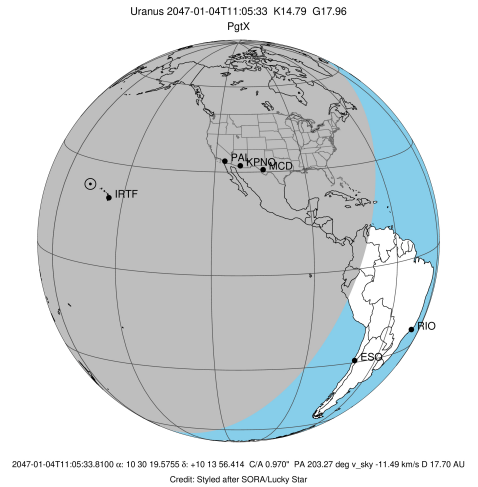


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2047-01-04T11:07:16.180
 Event type : PgtX
 : Uranus occs: geocentric, topocentric
 : No ring occs
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3882161810040368896
 2Mass ID (if available) : 10301957+1013566
 ICRS Star Coord at Epoch: 10h 30m 19.57548s +10:13:56.41358s
 RUWE (>1.4 is poor) : 0.90
 K magnitude : 14.792
 G magnitude : 17.963
 RP magnitude : 16.930
 BP magnitude : 19.003
 DUPflag : 0
 Distance (au) : 17.697
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -11.49
 Sun-Target sep (deg) : 127.86
 Sun-Moon sep (deg) : 139.94
 B (ring opening deg) : 11.95
 PA of pole (deg) : 103.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.121
 C/A sky separation (km) : 14389.3
 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_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	2047-01-04T10:49:51.145	b	65.50	-49.70	50900.10	-54.10		
lambda	I	2047-01-04T10:50:07.271	b	65.52	-49.65	50026.71	-54.12		
delta	I	2047-01-04T10:50:39.223	b	65.56	-49.54	48300.35	-53.94		
gamma	I	2047-01-04T10:50:51.643	b	65.57	-49.49	47630.90	-53.86		
eta	I	2047-01-04T10:51:00.090	b	65.58	-49.46	47176.12	-53.81		
beta	I	2047-01-04T10:51:27.620	b	65.61	-49.37	45680.06	-53.60		
alpha	I	2047-01-04T10:51:46.301	b	65.64	-49.30	44731.30	-53.57		
4	I	2047-01-04T10:52:25.824	b	65.68	-49.17	42598.83	-53.22		
5	I	2047-01-04T10:52:34.234	b	65.69	-49.14	42269.32	-53.26		
6	I	2047-01-04T10:52:43.444	b	65.70	-49.10	41846.28	-53.29		
Uranus	I	2047-01-04T10:37:35.136		64.44	-52.26	25545.86		-45.36	-46.67
Uranus	E	2047-01-04T11:36:55.280		66.62	-39.86	25538.69		62.21	63.27
6	E	2047-01-04T11:15:38.588	b	66.73	-44.31	41803.18	53.36		
5	E	2047-01-04T11:15:50.010	b	66.73	-44.27	42255.72	53.33		
4	E	2047-01-04T11:15:53.988	b	66.73	-44.26	42526.97	53.29		
alpha	E	2047-01-04T11:16:35.619	b	66.74	-44.11	44727.81	53.64		
beta	E	2047-01-04T11:16:53.975	b	66.75	-44.05	45642.00	53.67		
eta	E	2047-01-04T11:17:22.190	b	66.76	-43.95	47176.12	53.88		
gamma	E	2047-01-04T11:17:30.443	b	66.76	-43.92	47620.99	53.93		
delta	E	2047-01-04T11:17:43.031	b	66.76	-43.88	48300.35	54.01		
lambda	E	2047-01-04T11:18:14.944	b	66.77	-43.77	50026.71	54.18		
epsilon	E	2047-01-04T11:18:36.142	b	66.77	-43.69	51176.43	54.16		

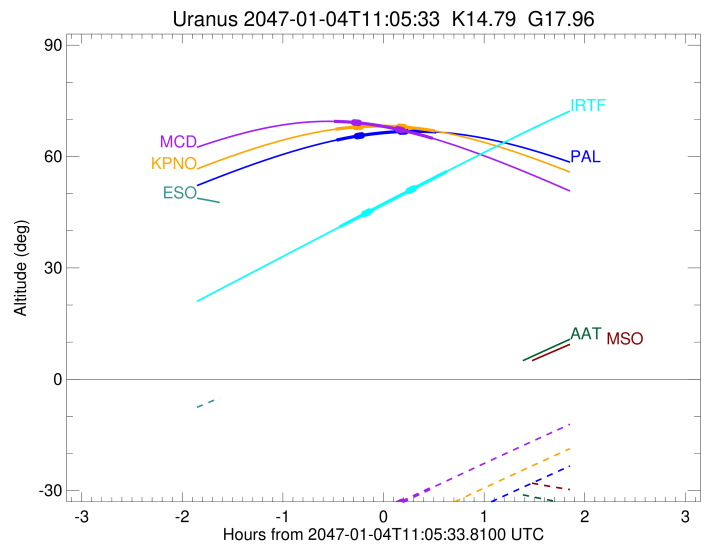
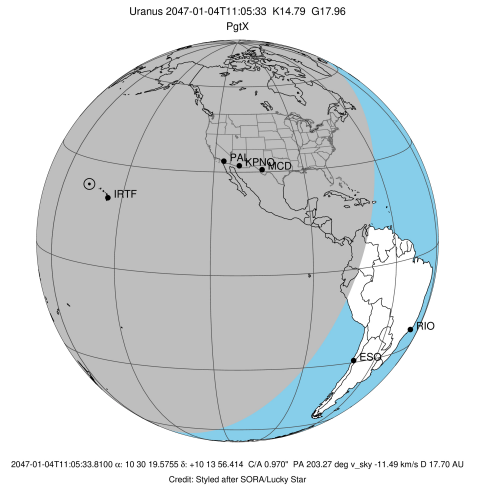
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2047-01-04T11:06:32.400
 Event type : PgtX
 : Uranus occs: geocentric, topocentric
 : No ring occs
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 3882161810040368896
 2Mass ID (if available) : 10301957+1013566
 ICRS Star Coord at Epoch: 10h 30m 19.57548s +10:13:56.41358s
 RUWE (>1.4 is poor) : 0.90
 K magnitude : 14.792
 G magnitude : 17.963
 RP magnitude : 16.930
 BP magnitude : 19.003
 DUPflag : 0
 Distance (au) : 17.697
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -11.49
 Sun-Target sep (deg) : 127.86
 Sun-Moon sep (deg) : 139.89
 B (ring opening deg) : 11.95
 PA of pole (deg) : 103.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.125
 C/A sky separation (km) : 14444.6
 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	2047-01-04T10:49:08.329	b	67.96	-45.44	50899.79	-54.12		
lambda	I	2047-01-04T10:49:24.444	b	67.97	-45.39	50026.71	-54.13		
delta	I	2047-01-04T10:49:56.387	b	67.98	-45.27	48300.35	-53.95		
gamma	I	2047-01-04T10:50:08.804	b	67.99	-45.23	47630.90	-53.88		
eta	I	2047-01-04T10:50:17.249	b	67.99	-45.20	47176.12	-53.82		
beta	I	2047-01-04T10:50:44.772	b	68.01	-45.10	45680.06	-53.61		
alpha	I	2047-01-04T10:51:03.447	b	68.02	-45.03	44731.34	-53.58		
4	I	2047-01-04T10:51:42.963	b	68.04	-44.90	42598.79	-53.23		
5	I	2047-01-04T10:51:51.373	b	68.04	-44.87	42269.42	-53.27		
6	I	2047-01-04T10:52:00.581	b	68.04	-44.83	41846.23	-53.30		
Uranus	I	2047-01-04T10:36:55.376		67.36	-48.04	25545.90		-45.25	-46.57
Uranus	E	2047-01-04T11:36:08.106		66.89	-35.48	25538.75		62.04	63.11
6	E	2047-01-04T11:14:54.366	b	68.03	-39.97	41803.15	53.35		
5	E	2047-01-04T11:15:05.794	b	68.02	-39.93	42255.84	53.32		
4	E	2047-01-04T11:15:09.764	b	68.02	-39.92	42526.95	53.28		
alpha	E	2047-01-04T11:15:51.402	b	68.00	-39.77	44727.86	53.63		
beta	E	2047-01-04T11:16:09.760	b	67.99	-39.71	45642.01	53.66		
eta	E	2047-01-04T11:16:37.977	b	67.97	-39.61	47176.12	53.87		
gamma	E	2047-01-04T11:16:46.231	b	67.97	-39.58	47620.99	53.93		
delta	E	2047-01-04T11:16:58.820	b	67.96	-39.54	48300.35	54.00		
lambda	E	2047-01-04T11:17:30.734	b	67.94	-39.42	50026.71	54.18		
epsilon	E	2047-01-04T11:17:51.923	b	67.93	-39.35	51175.93	54.16		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2047-01-04T11:05:31.060
 Event type : PgtX
 : Uranus occs: geocentric, topocentric
 : No ring occs
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 3882161810040368896
 2Mass ID (if available) : 10301957+1013566
 ICRS Star Coord at Epoch: 10h 30m 19.57548s +10:13:56.41358s
 RUWE (>1.4 is poor) : 0.90
 K magnitude : 14.792
 G magnitude : 17.963
 RP magnitude : 16.930
 BP magnitude : 19.003
 DUPflag : 0
 Distance (au) : 17.697
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -11.49
 Sun-Target sep (deg) : 127.86
 Sun-Moon sep (deg) : 139.82
 B (ring opening deg) : 11.95
 PA of pole (deg) : 103.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.138
 C/A sky separation (km) : 14608.9
 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

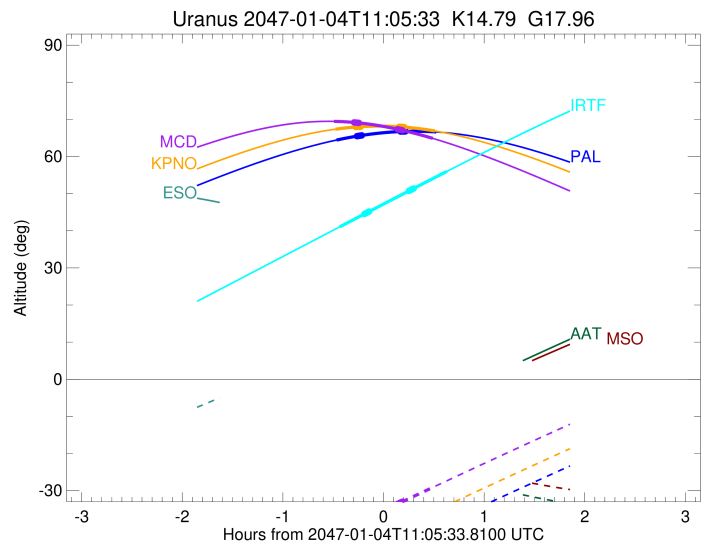
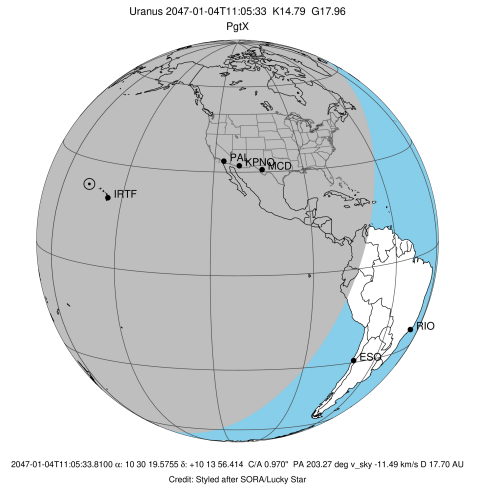


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2047-01-04T10:48:06.704	b	69.18	-39.11	50898.77	-54.07		
lambda	I	2047-01-04T10:48:22.814	b	69.17	-39.06	50026.71	-54.09		
delta	I	2047-01-04T10:48:54.784	b	69.15	-38.94	48300.35	-53.90		
gamma	I	2047-01-04T10:49:07.213	b	69.14	-38.90	47630.89	-53.82		
eta	I	2047-01-04T10:49:15.666	b	69.13	-38.87	47176.12	-53.77		
beta	I	2047-01-04T10:49:43.219	b	69.11	-38.77	45680.03	-53.55		
alpha	I	2047-01-04T10:50:01.908	b	69.10	-38.70	44731.46	-53.52		
4	I	2047-01-04T10:50:41.474	b	69.07	-38.56	42598.64	-53.15		
5	I	2047-01-04T10:50:49.901	b	69.06	-38.53	42269.71	-53.19		
6	I	2047-01-04T10:50:59.116	b	69.06	-38.50	41846.06	-53.22		
Uranus	I	2047-01-04T10:36:03.580		69.47	-41.70	25546.08		-44.87	-46.19
Uranus	E	2047-01-04T11:34:58.146		64.89	-29.13	25538.92		61.61	62.69
6	E	2047-01-04T11:13:50.835	b	67.37	-33.61	41803.03	53.26		
5	E	2047-01-04T11:14:02.294	b	67.35	-33.57	42256.17	53.22		
4	E	2047-01-04T11:14:06.245	b	67.34	-33.56	42526.91	53.18		
alpha	E	2047-01-04T11:14:47.962	b	67.27	-33.41	44727.99	53.54		
beta	E	2047-01-04T11:15:06.345	b	67.24	-33.34	45642.03	53.58		
eta	E	2047-01-04T11:15:34.605	b	67.20	-33.24	47176.12	53.79		
gamma	E	2047-01-04T11:15:42.871	b	67.18	-33.22	47621.00	53.85		
delta	E	2047-01-04T11:15:55.478	b	67.16	-33.17	48300.35	53.93		
lambda	E	2047-01-04T11:16:27.437	b	67.11	-33.06	50026.71	54.11		
epsilon	E	2047-01-04T11:16:48.628	b	67.07	-32.98	51174.51	54.09		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2047-01-04T11:11:32.330
Event type           : PgtX
: Uranus occs: geocentric, topocentric
: No ring occs
Observer code        : IRTF
Location             : Mauna Kea/IRTF
Latitude (deg)       : 19.82622
E. Longitude (deg)   : 204.52800
Altitude (km)        : 4.168
Gaia source ID       : 3882161810040368896
2Mass ID (if available) : 10301957+1013566
ICRS Star Coord at Epoch: 10h 30m 19.57548s +10:13:56.41358s
RUWE (>1.4 is poor) : 0.90
K magnitude          : 14.792
G magnitude          : 17.963
RP magnitude         : 16.930
BP magnitude         : 19.003
DUPflag             : 0
Distance (au)        : 17.697
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -11.49
Sun-Target sep (deg) : 127.86
Sun-Moon sep (deg)   : 140.11
B (ring opening deg) : 11.95
PA of pole (deg)     : 103.51
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.926
C/A sky separation (km) : 11882.3
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.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
    
```



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	2047-01-04T10:54:17.149	b	44.55	-82.89	50916.45	-54.55		
lambda	I	2047-01-04T10:54:33.442	b	44.61	-82.83	50026.71	-54.58		
delta	I	2047-01-04T10:55:05.103	b	44.73	-82.72	48300.35	-54.47		
gamma	I	2047-01-04T10:55:17.397	b	44.78	-82.68	47631.04	-54.42		
eta	I	2047-01-04T10:55:25.759	b	44.81	-82.65	47176.11	-54.39		
beta	I	2047-01-04T10:55:52.964	b	44.92	-82.55	45680.42	-54.24		
alpha	I	2047-01-04T10:56:11.524	b	44.99	-82.49	44729.47	-54.25		
4	I	2047-01-04T10:56:50.495	b	45.15	-82.35	42600.98	-54.02		
5	I	2047-01-04T10:56:58.683	b	45.18	-82.32	42264.77	-54.07		
6	I	2047-01-04T10:57:07.828	b	45.21	-82.29	41848.86	-54.15		
Uranus	I	2047-01-04T10:39:35.970		41.09	-85.74	25543.21		-51.26	-52.53
Uranus	E	2047-01-04T11:43:21.071		56.00	-71.88	25536.65		68.15	69.04
6	E	2047-01-04T11:20:37.764	b	50.72	-77.07	41804.89	54.34		
5	E	2047-01-04T11:20:48.818	b	50.76	-77.03	42250.74	54.27		
4	E	2047-01-04T11:20:53.123	b	50.78	-77.01	42527.67	54.22		
alpha	E	2047-01-04T11:21:33.967	b	50.94	-76.86	44725.84	54.45		
beta	E	2047-01-04T11:21:52.101	b	51.01	-76.79	45641.68	54.44		
eta	E	2047-01-04T11:22:19.927	b	51.12	-76.68	47176.12	54.59		
gamma	E	2047-01-04T11:22:28.074	b	51.15	-76.65	47620.96	54.62		
delta	E	2047-01-04T11:22:40.506	b	51.20	-76.60	48300.35	54.67		
lambda	E	2047-01-04T11:23:12.048	b	51.32	-76.49	50026.71	54.79		
epsilon	E	2047-01-04T11:23:33.404	b	51.40	-76.40	51197.57	54.76		