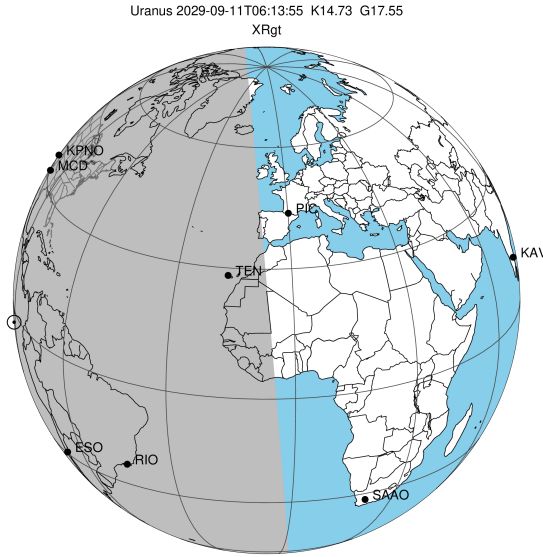


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-09-11T06:13:55.920  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3415380843005608960  
 2Mass ID (if available) : 05080642+2255062

ICRS Star Coord at Epoch: 05h 08m 06.42764s +22:55:06.08398s

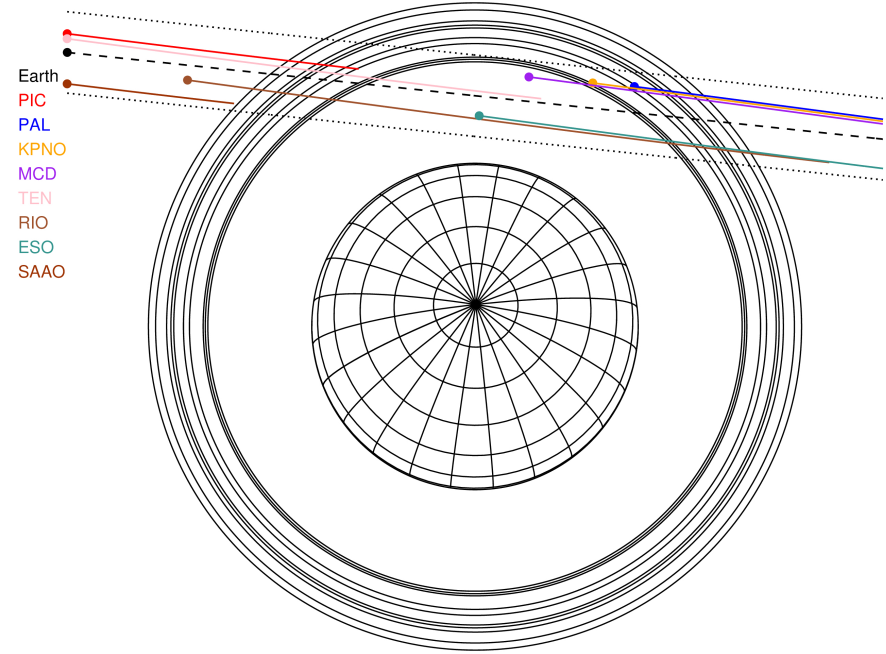
RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.735  
 G magnitude : 17.549  
 RP magnitude : 16.717  
 BP magnitude : 18.269  
 DUPflag : 0  
 Distance (au) : 19.209  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 6.15  
 Sun-Target sep (deg) : 90.33  
 Sun-Moon sep (deg) : 129.41  
 B (ring opening deg) : 82.25  
 PA of pole (deg) : -2.04

#	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



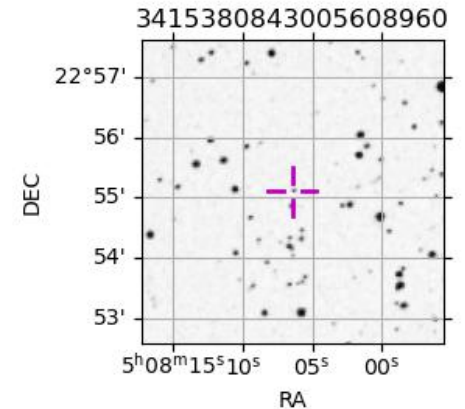
2029-09-11T06:13:55.9200 ra: 05 08 06.4276 s: +22 55 06.084 C/A 2.582° PA 173.93 deg v\_sky + 6.15 km/s D 19.21 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2029-09-11T06:13:55 K14.73 G17.55 XRgt

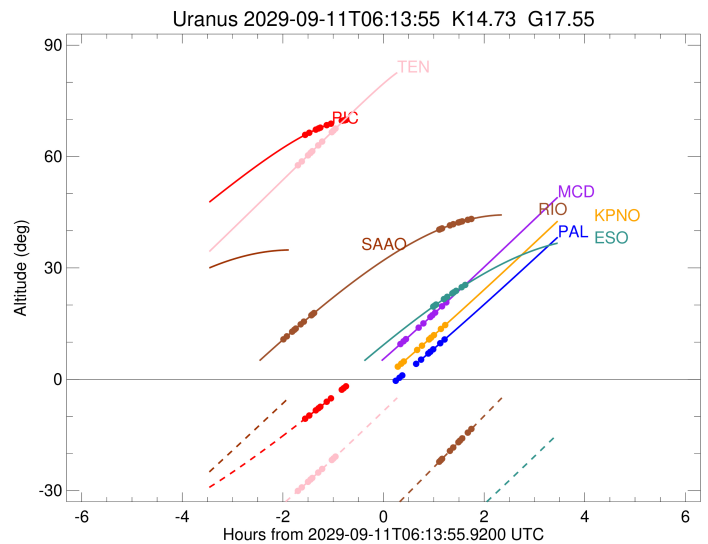
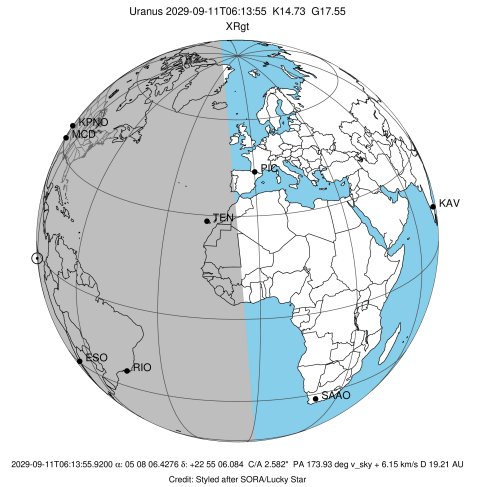


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++++			SEP 11 04:41 - SEP 11 05:11	PnnRin
PAL	Palomar Mt (200")	33.4	243.1			+++++	SEP 11 06:58 - SEP 11 07:25	PnnRne
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4			+++++++	SEP 11 06:53 - SEP 11 07:25	PnnRne
MCD	McDonald Obs. 2.7m	30.7	256.0			+++++++	SEP 11 06:34 - SEP 11 07:27	PnnRne
TEN	Teide Obs./Tenerife	28.3	343.5	+++++++			SEP 11 04:33 - SEP 11 05:16	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	+++++++		+++++++	SEP 11 04:15 - SEP 11 07:57	PnnRie
ESO	European Southern Obs	-29.3	289.3			+++++++	SEP 11 07:13 - SEP 11 07:50	PnnRne
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 : 2029-09-11T06:16:27.870  
 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 : 3415380843005608960  
 2Mass ID (if available) : 05080642+2255062  
 ICRS Star Coord at Epoch: 05h 08m 06.42764s +22:55:06.08398s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.735  
 G magnitude : 17.549  
 RP magnitude : 16.717  
 BP magnitude : 18.269  
 DUPflag : 0  
 Distance (au) : 19.209  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 6.15  
 Sun-Target sep (deg) : 90.33  
 Sun-Moon sep (deg) : 130.19  
 B (ring opening deg) : 82.25  
 PA of pole (deg) : -2.04  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.730  
 C/A sky separation (km) : 38034.5  
 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

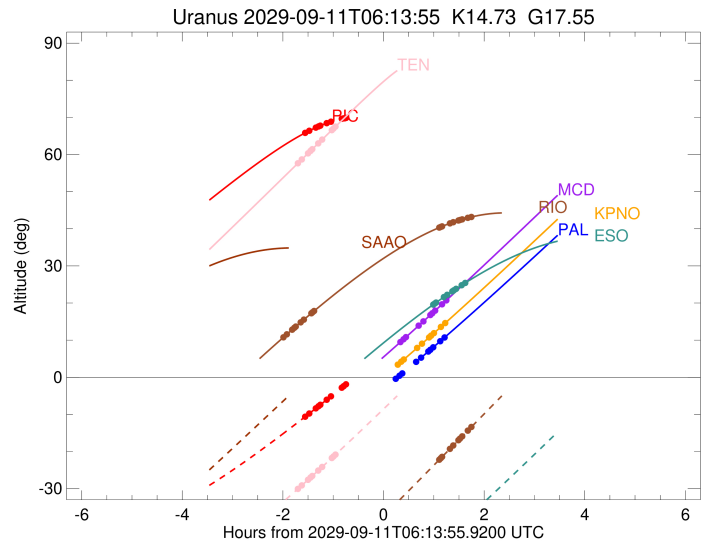
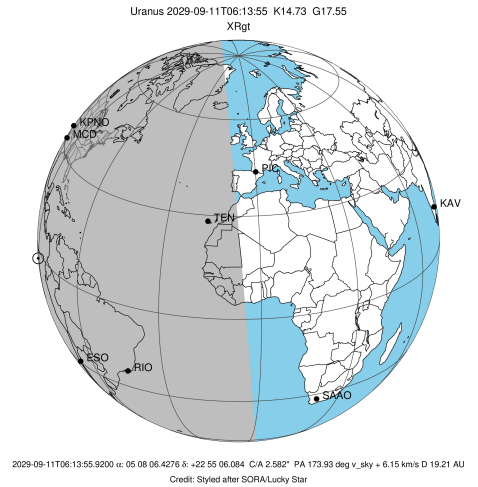


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-09-11T04:41:50.437		65.99	-10.39	50854.38	-3.84		
lambda	I	2029-09-11T04:45:27.204		66.41	-9.75	50026.71	-3.77		
delta	I	2029-09-11T04:53:17.283		67.25	-8.36	48300.35	-3.57		
gamma	I	2029-09-11T04:56:27.691		67.57	-7.80	47629.46	-3.48		
eta	I	2029-09-11T04:58:39.223		67.78	-7.41	47176.12	-3.41		
beta	I	2029-09-11T05:06:12.281		68.45	-6.05	45681.11	-3.18		
alpha	I	2029-09-11T05:11:34.109		68.87	-5.09	44684.83	-3.00		
4	I	2029-09-11T05:23:59.111		69.63	-2.84x	42614.25	-2.54		
5	I	2029-09-11T05:26:00.442		69.73	-2.48x	42314.94	-2.46		
6	I	2029-09-11T05:28:59.644		69.85	-1.94x	41879.71	-2.34		

No planet occultations

6	E	2029-09-11T07:04:10.387		64.55	15.47x	41864.93	2.33		
5	E	2029-09-11T07:07:10.825		64.15	16.01x	42292.20	2.45		
4	E	2029-09-11T07:09:17.498		63.87	16.40x	42609.28	2.53		
alpha	E	2029-09-11T07:21:55.371		62.09	18.67x	44705.76	2.99		
beta	E	2029-09-11T07:27:08.827		61.32	19.61x	45671.46	3.17		
eta	E	2029-09-11T07:34:47.269		60.15	20.97x	47176.12	3.40		
gamma	E	2029-09-11T07:37:00.080		59.81	21.37x	47631.28	3.46		
delta	E	2029-09-11T07:40:11.090		59.31	21.93x	48300.35	3.55		
lambda	E	2029-09-11T07:48:04.146		58.05	23.32x	50026.71	3.75		
epsilon	E	2029-09-11T07:51:35.434		57.48	23.94x	50827.76	3.81		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-09-11T06:03:56.450  
 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 : 3415380843005608960  
 2Mass ID (if available) : 05080642+2255062  
 ICRS Star Coord at Epoch: 05h 08m 06.42764s +22:55:06.08398s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.735  
 G magnitude : 17.549  
 RP magnitude : 16.717  
 BP magnitude : 18.269  
 DUPflag : 0  
 Distance (au) : 19.209  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 6.15  
 Sun-Target sep (deg) : 90.33  
 Sun-Moon sep (deg) : 128.87  
 B (ring opening deg) : 82.25  
 PA of pole (deg) : -2.04  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.903  
 C/A sky separation (km) : 40444.6  
 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



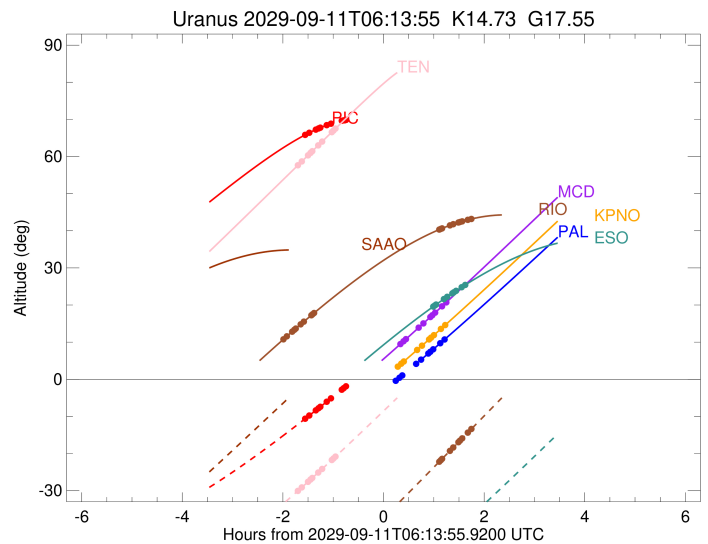
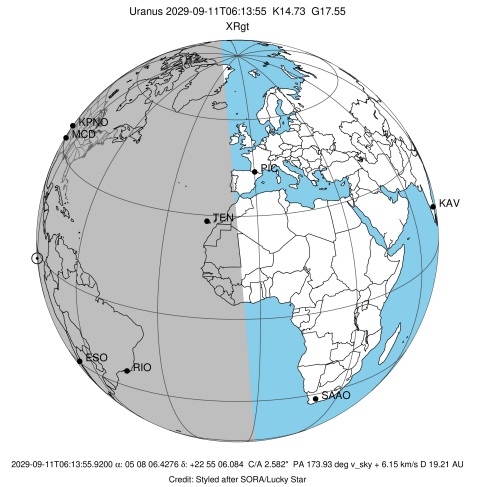
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-09-11T04:44:48.599	-17.98x	-33.33	50831.71	-3.80			
lambda	I	2029-09-11T04:48:22.199	-17.44x	-33.96	50026.71	-3.71			
delta	I	2029-09-11T04:56:25.975	-16.21x	-35.35	48300.35	-3.42			
gamma	I	2029-09-11T04:59:45.512	-15.69x	-35.92	47629.88	-3.30			
eta	I	2029-09-11T05:02:05.087	-15.33x	-36.31	47176.12	-3.21			
beta	I	2029-09-11T05:10:17.289	-14.02x	-37.67	45681.23	-2.86			
alpha	I	2029-09-11T05:16:21.756	-13.04x	-38.66	44685.62	-2.59			
4	I	2029-09-11T05:31:56.248	-10.46x	-41.09	42616.06	-1.82			
5	I	2029-09-11T05:34:50.998	-9.96x	-41.53	42314.90	-1.66			
6	I	2029-09-11T05:39:32.687	-9.16x	-42.22	41878.51	-1.41			

No planet occultations

6	E	2029-09-11T06:28:44.009	-0.38x	-48.39	41869.93	1.39			
5	E	2029-09-11T06:33:30.649	0.51x	-48.86	42299.93	1.64			
4	E	2029-09-11T06:36:33.138	1.08x	-49.15	42612.32	1.79			
alpha	E	2029-09-11T06:52:38.958	4.12x	-50.49	44702.77	2.52			
beta	E	2029-09-11T06:58:44.519	5.28	-50.91	45672.91	2.78			
eta	E	2029-09-11T07:07:16.245	6.92	-51.41	47176.12	3.09			
gamma	E	2029-09-11T07:09:41.442	7.39	-51.54	47631.39	3.18			
delta	E	2029-09-11T07:13:08.192	8.06	-51.71	48300.35	3.29			
lambda	E	2029-09-11T07:21:32.232	9.69	-52.04	50026.71	3.55			
epsilon	E	2029-09-11T07:25:10.980	10.41	-52.15	50815.14	3.63			

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2029-09-11T06:03:22.340
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       : 3415380843005608960
2Mass ID (if available) : 05080642+2255062
ICRS Star Coord at Epoch: 05h 08m 06.42764s +22:55:06.08398s
RUWE (>1.4 is poor) : 1.00
K magnitude          : 14.735
G magnitude          : 17.549
RP magnitude         : 16.717
BP magnitude         : 18.269
DUPflag             : 0
Distance (au)        : 19.209
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : 6.15
Sun-Target sep (deg) : 90.33
Sun-Moon sep (deg)   : 128.89
B (ring opening deg) : 82.25
PA of pole (deg)     : -2.04
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.885
C/A sky separation (km) : 40188.5
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_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
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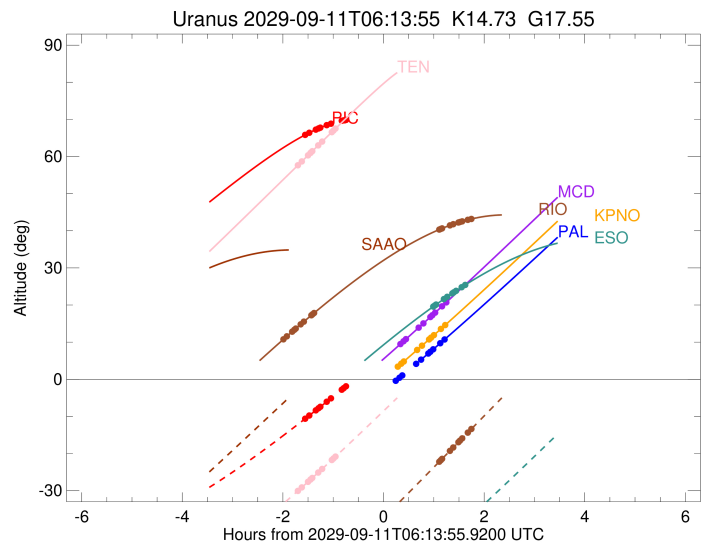
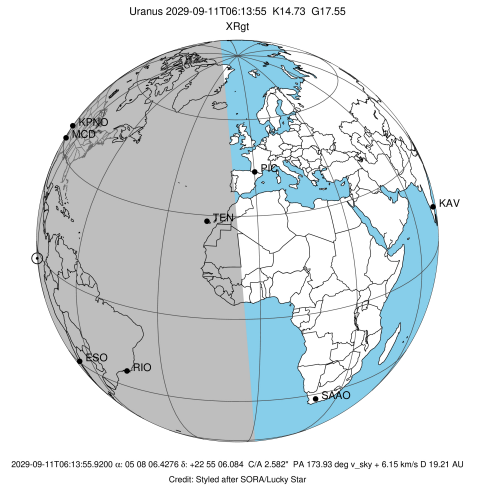


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-09-11T04:43:02.719	-15.93x	-37.47	50833.40	-3.83			
lambda	I	2029-09-11T04:46:34.826	-15.36x	-38.07	50026.71	-3.75			
delta	I	2029-09-11T04:54:33.298	-14.05x	-39.41	48300.35	-3.47			
gamma	I	2029-09-11T04:57:50.190	-13.50x	-39.95	47629.85	-3.34			
eta	I	2029-09-11T05:00:07.700	-13.12x	-40.33	47176.12	-3.26			
beta	I	2029-09-11T05:08:11.021	-11.75x	-41.62	45681.23	-2.93			
alpha	I	2029-09-11T05:14:06.752	-10.73x	-42.54	44685.52	-2.66			
4	I	2029-09-11T05:29:02.830	-8.11x	-44.75	42615.92	-1.94			
5	I	2029-09-11T05:31:45.863	-7.63x	-45.14	42315.04	-1.80			
6	I	2029-09-11T05:36:03.263	-6.86x	-45.73	41878.75	-1.56			

No planet occultations

6	E	2029-09-11T06:31:08.891	3.43x	-51.74	41869.15	1.54			
5	E	2029-09-11T06:35:31.441	4.28x	-52.07	42298.77	1.76			
4	E	2029-09-11T06:38:22.439	4.83x	-52.27	42611.89	1.90			
alpha	E	2029-09-11T06:53:51.124	7.87	-53.14	44703.24	2.59			
beta	E	2029-09-11T06:59:48.469	9.04	-53.38	45672.68	2.83			
eta	E	2029-09-11T07:08:12.252	10.72	-53.63	47176.12	3.13			
gamma	E	2029-09-11T07:10:35.664	11.19	-53.68	47631.37	3.21			
delta	E	2029-09-11T07:14:00.191	11.88	-53.74	48300.35	3.33			
lambda	E	2029-09-11T07:22:20.032	13.55	-53.80	50026.71	3.58			
epsilon	E	2029-09-11T07:25:58.029	14.28	-53.80	50817.46	3.65			

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-09-11T06:02:49.030  
 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 : 3415380843005608960  
 2Mass ID (if available) : 05080642+2255062  
 ICRS Star Coord at Epoch: 05h 08m 06.42764s +22:55:06.08398s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.735  
 G magnitude : 17.549  
 RP magnitude : 16.717  
 BP magnitude : 18.269  
 DUPflag : 0  
 Distance (au) : 19.209  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 6.15  
 Sun-Target sep (deg) : 90.33  
 Sun-Moon sep (deg) : 128.94  
 B (ring opening deg) : 82.25  
 PA of pole (deg) : -2.04  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.860  
 C/A sky separation (km) : 39843.5  
 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

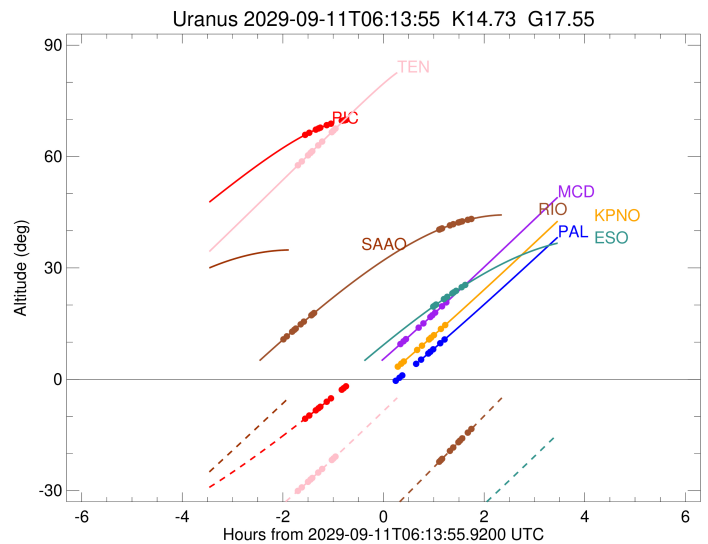
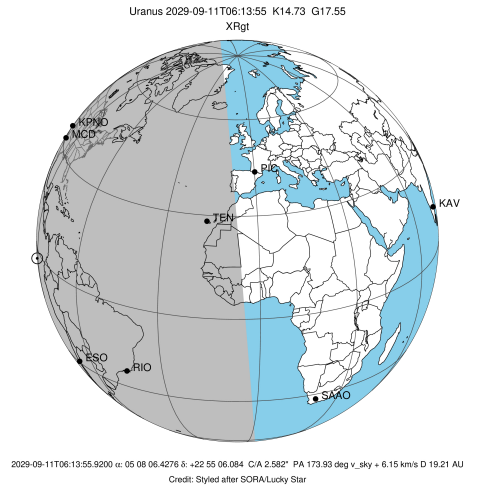


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-09-11T04:40:47.526	-12.02x	-42.94	50835.69	-3.87			
lambda	I	2029-09-11T04:44:18.016	-11.41x	-43.50	50026.71	-3.79			
delta	I	2029-09-11T04:52:10.358	-10.02x	-44.71	48300.35	-3.52			
gamma	I	2029-09-11T04:55:24.167	-9.44x	-45.20	47629.80	-3.40			
eta	I	2029-09-11T04:57:39.261	-9.03x	-45.54	47176.12	-3.32			
beta	I	2029-09-11T05:05:32.186	-7.60x	-46.68	45681.23	-3.00			
alpha	I	2029-09-11T05:11:17.751	-6.55x	-47.48	44685.40	-2.75			
4	I	2029-09-11T05:25:31.146	-3.90x	-49.32	42615.73	-2.08			
5	I	2029-09-11T05:28:02.012	-3.43x	-49.62	42315.16	-1.95			
6	I	2029-09-11T05:31:55.590	-2.70x	-50.08	41879.00	-1.75			

No planet occultations

6	E	2029-09-11T06:34:14.943	9.51	-54.80	41868.19	1.71			
5	E	2029-09-11T06:38:13.904	10.32	-54.91	42297.29	1.91			
4	E	2029-09-11T06:40:53.014	10.85	-54.97	42611.31	2.03			
alpha	E	2029-09-11T06:55:40.554	13.86	-55.08	44703.85	2.67			
beta	E	2029-09-11T07:01:28.332	15.05	-55.02	45672.38	2.89			
eta	E	2029-09-11T07:09:42.834	16.75	-54.85	47176.12	3.18			
gamma	E	2029-09-11T07:12:04.162	17.23	-54.78	47631.35	3.26			
delta	E	2029-09-11T07:15:26.103	17.93	-54.67	48300.35	3.37			
lambda	E	2029-09-11T07:23:41.117	19.64	-54.31	50026.71	3.60			
epsilon	E	2029-09-11T07:27:18.385	20.39	-54.12	50820.50	3.68			

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-09-11T06:12:36.280  
 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 : 3415380843005608960  
 2Mass ID (if available) : 05080642+2255062  
 ICRS Star Coord at Epoch: 05h 08m 06.42764s +22:55:06.08398s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.735  
 G magnitude : 17.549  
 RP magnitude : 16.717  
 BP magnitude : 18.269  
 DUPflag : 0  
 Distance (au) : 19.209  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 6.15  
 Sun-Target sep (deg) : 90.33  
 Sun-Moon sep (deg) : 130.07  
 B (ring opening deg) : 82.25  
 PA of pole (deg) : -2.04  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.631  
 C/A sky separation (km) : 36647.8  
 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



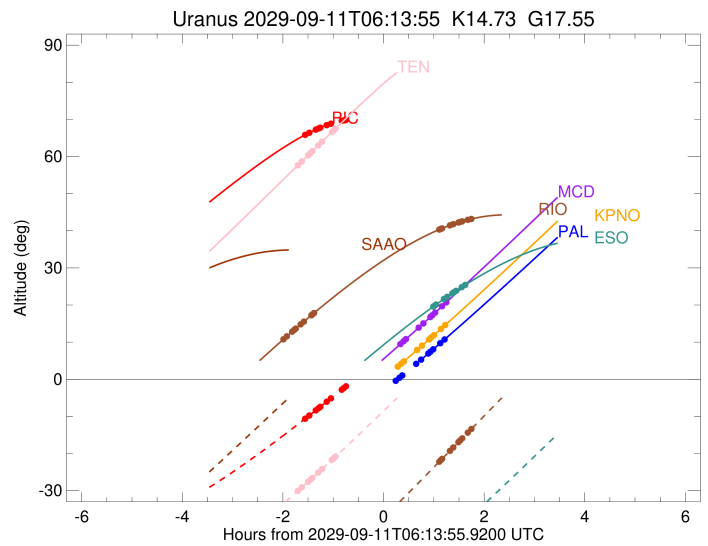
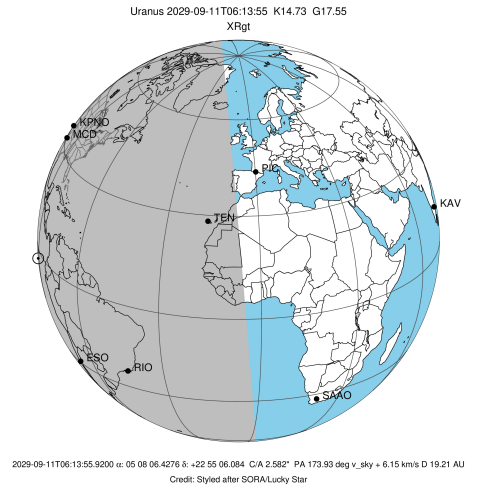
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-09-11T04:33:03.792		57.92	-29.82	50863.34	-4.02		
lambda	I	2029-09-11T04:36:32.863		58.69	-29.12	50026.71	-3.96		
delta	I	2029-09-11T04:43:58.913		60.33	-27.61	48300.35	-3.78		
gamma	I	2029-09-11T04:46:58.472		60.99	-27.00	47629.30	-3.70		
eta	I	2029-09-11T04:49:01.980		61.45	-26.58	47176.12	-3.64		
beta	I	2029-09-11T04:56:04.270		63.00	-25.13	45680.99	-3.44		
alpha	I	2029-09-11T05:01:00.456		64.09	-24.11	44684.69	-3.28		
4	I	2029-09-11T05:12:09.365		66.54	-21.78	42613.30	-2.90		
5	I	2029-09-11T05:13:55.289		66.93	-21.41	42314.33	-2.83		
6	I	2029-09-11T05:16:29.448		67.49	-20.87	41879.73	-2.73		

No planet occultations

6	E	2029-09-11T07:09:16.503		83.72	3.55x	41862.08	2.70		
5	E	2029-09-11T07:11:53.156		83.37	4.12x	42287.42	2.79		
4	E	2029-09-11T07:13:45.732		83.10	4.54x	42607.21	2.86		
alpha	E	2029-09-11T07:25:15.288		81.16	7.07x	44707.88	3.23		
beta	E	2029-09-11T07:30:06.501		80.25	8.14x	45670.37	3.38		
eta	E	2029-09-11T07:37:19.931		78.83	9.73x	47176.12	3.57		
gamma	E	2029-09-11T07:39:26.452		78.41	10.19x	47631.17	3.62		
delta	E	2029-09-11T07:42:29.225		77.79	10.87x	48300.35	3.70		
lambda	E	2029-09-11T07:50:05.080		76.22	12.54x	50026.71	3.87		
epsilon	E	2029-09-11T07:53:33.167		75.49	13.30x	50840.29	3.93		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2029-09-11T06:04:55.890
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      : 3415380843005608960
2Mass ID (if available) : 05080642+2255062
ICRS Star Coord at Epoch: 05h 08m 06.42764s +22:55:06.08398s
RUWE (>1.4 is poor) : 1.00
K magnitude         : 14.735
G magnitude         : 17.549
RP magnitude        : 16.717
BP magnitude        : 18.269
DUPflag            : 0
Distance (au)       : 19.209
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : 6.15
Sun-Target sep (deg) : 90.33
Sun-Moon sep (deg)  : 129.48
B (ring opening deg) : 82.25
PA of pole (deg)    : -2.04
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.318
C/A sky separation (km) : 32290.2
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
  
```

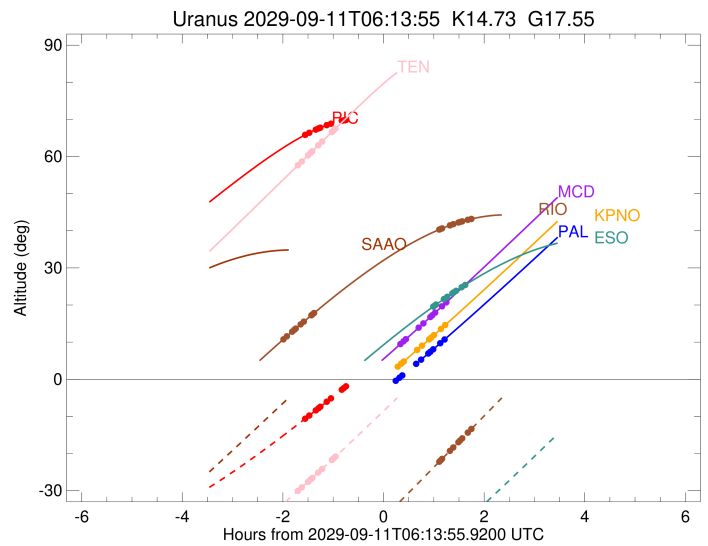
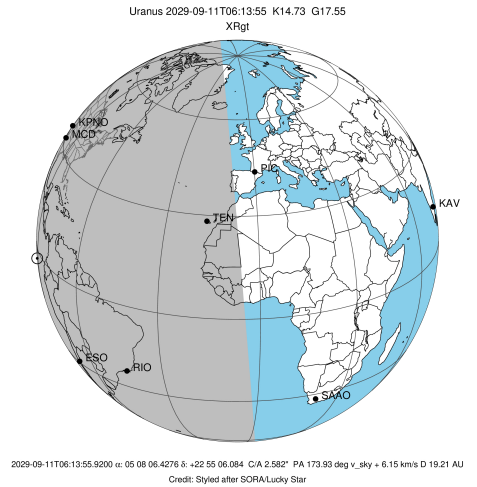


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-09-11T04:15:32.786		10.95	-62.30	50896.58	-4.62		
lambda	I	2029-09-11T04:18:41.371		11.57	-61.73	50026.71	-4.58		
delta	I	2029-09-11T04:25:03.694		12.83	-60.54	48300.35	-4.45		
gamma	I	2029-09-11T04:27:35.675		13.33	-60.06	47628.72	-4.39		
eta	I	2029-09-11T04:29:19.231		13.66	-59.73	47176.12	-4.35		
beta	I	2029-09-11T04:35:08.666		14.79	-58.59	45680.36	-4.21		
alpha	I	2029-09-11T04:39:08.003		15.56	-57.81	44684.73	-4.10		
4	I	2029-09-11T04:47:48.819		17.22	-56.06	42609.81	-3.86		
5	I	2029-09-11T04:49:08.072		17.47	-55.79	42311.00	-3.82		
6	I	2029-09-11T04:51:00.664		17.82	-55.41	41878.84	-3.75		

No planet occultations

6	E	2029-09-11T07:20:27.120		40.33	-22.21	41854.59	3.61		
5	E	2029-09-11T07:22:23.892		40.51	-21.76	42274.50	3.67		
4	E	2029-09-11T07:23:51.826		40.65	-21.43	42601.25	3.71		
alpha	E	2029-09-11T07:33:04.877		41.45	-19.30	44713.50	3.93		
beta	E	2029-09-11T07:37:04.622		41.77	-18.38	45667.37	4.02		
eta	E	2029-09-11T07:43:13.923		42.23	-16.97	47176.12	4.15		
gamma	E	2029-09-11T07:45:03.128		42.35	-16.55	47630.82	4.18		
delta	E	2029-09-11T07:47:42.324		42.53	-15.93	48300.35	4.23		
lambda	E	2029-09-11T07:54:24.902		42.95	-14.39	50026.71	4.34		
epsilon	E	2029-09-11T07:57:39.581		43.13	-13.64	50877.52	4.37		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-09-11T06:01:26.380  
 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 : 3415380843005608960  
 2Mass ID (if available) : 05080642+2255062  
 ICRS Star Coord at Epoch: 05h 08m 06.42764s +22:55:06.08398s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.735  
 G magnitude : 17.549  
 RP magnitude : 16.717  
 BP magnitude : 18.269  
 DUPflag : 0  
 Distance (au) : 19.209  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 6.15  
 Sun-Target sep (deg) : 90.33  
 Sun-Moon sep (deg) : 129.04  
 B (ring opening deg) : 82.25  
 PA of pole (deg) : -2.04  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.354  
 C/A sky separation (km) : 32800.8  
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-09-11T04:16:24.572	-13.92x	-64.76	50892.46	-4.70			
lambda	I	2029-09-11T04:19:28.950	-13.28x	-64.90	50026.71	-4.66			
delta	I	2029-09-11T04:25:44.921	-11.99x	-65.14	48300.35	-4.52			
gamma	I	2029-09-11T04:28:14.535	-11.47x	-65.21	47628.79	-4.46			
eta	I	2029-09-11T04:29:56.568	-11.12x	-65.25	47176.12	-4.41			
beta	I	2029-09-11T04:35:41.221	-9.95x	-65.34	45680.46	-4.26			
alpha	I	2029-09-11T04:39:37.767	-9.14x	-65.35	44684.69	-4.15			
4	I	2029-09-11T04:48:13.881	-7.39x	-65.27	42610.28	-3.88			
5	I	2029-09-11T04:49:32.644	-7.12x	-65.24	42311.51	-3.84			
6	I	2029-09-11T04:51:24.789	-6.75x	-65.19	41879.01	-3.77			

No planet occultations

6	E	2029-09-11T07:13:14.829	19.58	-46.04	41855.15	3.60			
5	E	2029-09-11T07:15:11.959	19.89	-45.66	42275.48	3.67			
4	E	2029-09-11T07:16:39.870	20.13	-45.37	42601.71	3.70			
alpha	E	2029-09-11T07:25:52.140	21.59	-43.55	44713.12	3.94			
beta	E	2029-09-11T07:29:51.247	22.21	-42.75	45667.57	4.04			
eta	E	2029-09-11T07:35:58.837	23.14	-41.52	47176.12	4.17			
gamma	E	2029-09-11T07:37:47.469	23.42	-41.15	47630.84	4.20			
delta	E	2029-09-11T07:40:25.759	23.81	-40.61	48300.35	4.25			
lambda	E	2029-09-11T07:47:05.803	24.79	-39.25	50026.71	4.37			
epsilon	E	2029-09-11T07:50:18.697	25.26	-38.59	50875.48	4.40			