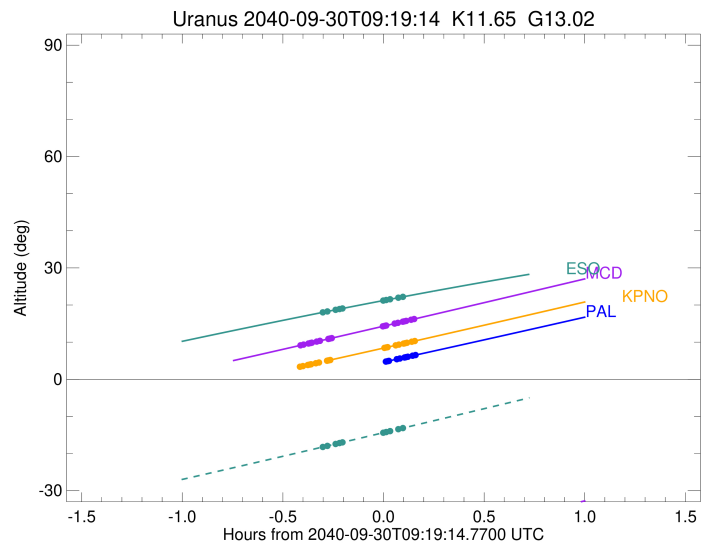
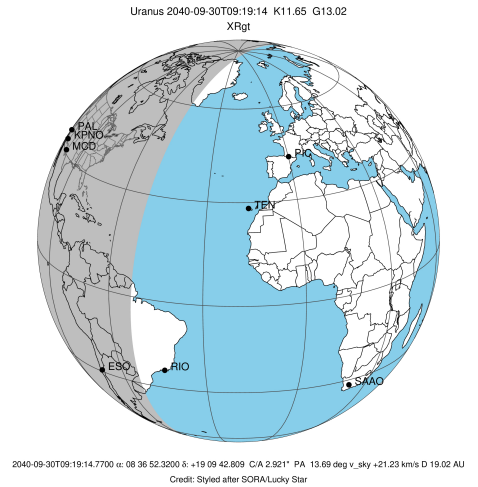




target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2040-09-30T09:14:21.840  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 659763434012615296  
 2Mass ID (if available) : 08365230+1909427  
 ICRS Star Coord at Epoch: 08h 36m 52.31997s +19:09:42.80921s  
 RUWE (>1.4 is poor) : 1.09  
 K magnitude : 11.654  
 G magnitude : 13.023  
 RP magnitude : 12.551  
 BP magnitude : 13.336  
 DUPflag : 0  
 Distance (au) : 19.023  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 21.23  
 Sun-Target sep (deg) : 60.59  
 Sun-Moon sep (deg) : 6.05  
 B (ring opening deg) : 40.42  
 PA of pole (deg) : 93.90  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.766  
 C/A sky separation (km) : 38161.8  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

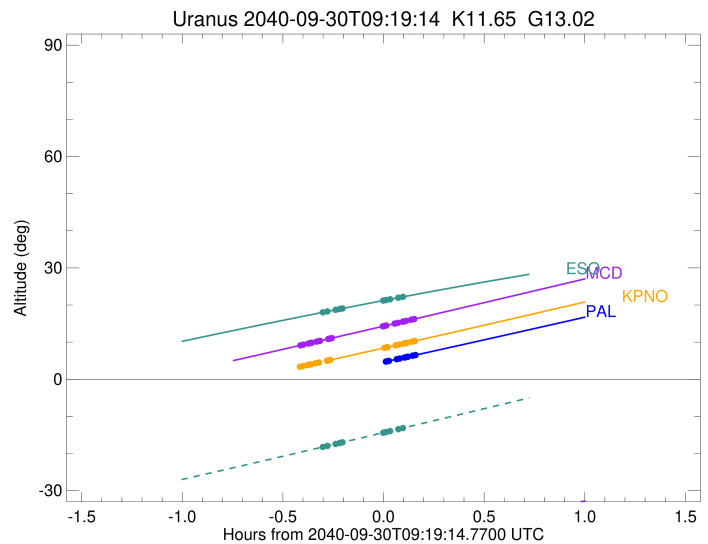
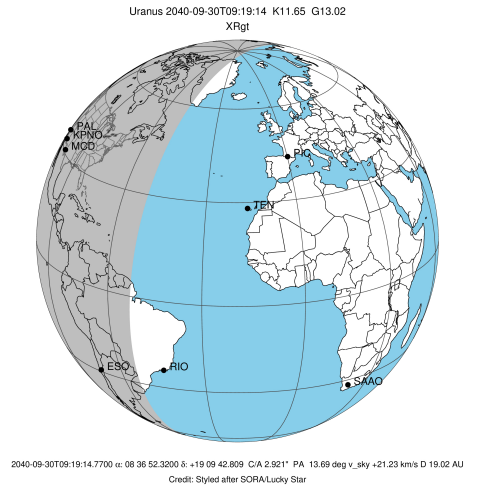


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2040-09-30T08:54:31.270	-0.20x	-54.91	50826.87	-21.41			
lambda	I	2040-09-30T08:55:09.269	-0.08x	-54.83	50026.71	-20.82			
delta	I	2040-09-30T08:56:34.454	0.19x	-54.66	48300.35	-19.69			
gamma	I	2040-09-30T08:57:09.024	0.30x	-54.59	47628.10	-19.20			
eta	I	2040-09-30T08:57:32.783	0.38x	-54.54	47176.12	-18.85			
beta	I	2040-09-30T08:58:57.088	0.65x	-54.37	45642.57	-17.52			
alpha	I	2040-09-30T08:59:51.663	0.83x	-54.25	44707.02	-16.56			
4	I	2040-09-30T09:02:12.610	1.29x	-53.95	42564.53	-13.89			
5	I	2040-09-30T09:02:42.490	1.38x	-53.89	42165.19	-13.30			
6	I	2040-09-30T09:03:08.405	1.47x	-53.83	41804.44	-12.69			

No planet occultations

6	E	2040-09-30T09:19:52.619	4.75x	-51.53	41795.01	12.67			
5	E	2040-09-30T09:20:21.039	4.84x	-51.46	42159.06	13.28			
4	E	2040-09-30T09:20:48.972	4.94x	-51.39	42532.40	13.87			
alpha	E	2040-09-30T09:23:08.926	5.40	-51.05	44685.04	16.52			
beta	E	2040-09-30T09:24:06.887	5.59	-50.91	45660.25	17.48			
eta	E	2040-09-30T09:25:30.223	5.86	-50.70	47176.12	18.80			
gamma	E	2040-09-30T09:25:54.228	5.94	-50.64	47631.57	19.15			
delta	E	2040-09-30T09:26:28.713	6.06	-50.55	48300.35	19.64			
lambda	E	2040-09-30T09:27:54.150	6.34	-50.34	50026.71	20.76			
epsilon	E	2040-09-30T09:28:56.724	6.55	-50.18	51349.31	21.34			

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2040-09-30T09:14:19.310  
 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 : 659763434012615296  
 2Mass ID (if available) : 08365230+1909427  
 ICRS Star Coord at Epoch: 08h 36m 52.31997s +19:09:42.80921s  
 RUWE (>1.4 is poor) : 1.09  
 K magnitude : 11.654  
 G magnitude : 13.023  
 RP magnitude : 12.551  
 BP magnitude : 13.336  
 DUPflag : 0  
 Distance (au) : 19.023  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 21.23  
 Sun-Target sep (deg) : 60.59  
 Sun-Moon sep (deg) : 6.08  
 B (ring opening deg) : 40.42  
 PA of pole (deg) : 93.90  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.788  
 C/A sky separation (km) : 38465.2  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

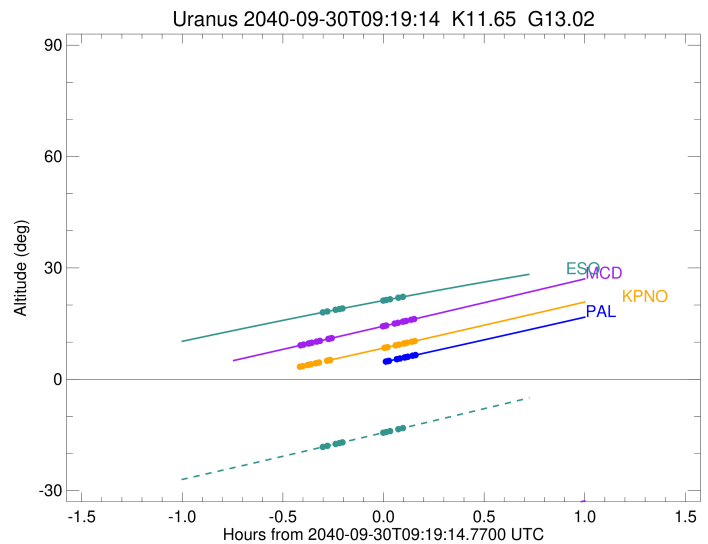
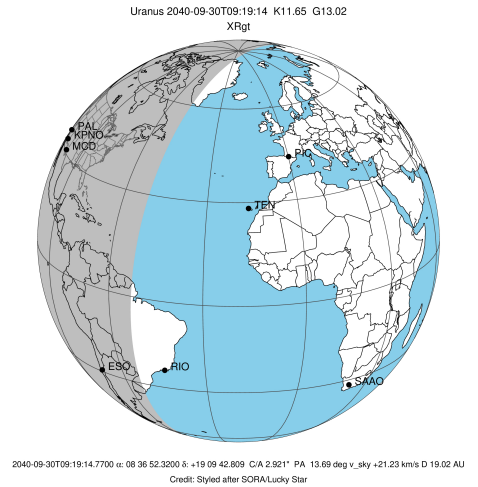


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2040-09-30T08:54:36.054		3.43x	-53.14	50829.17	-21.15		
lambda	I	2040-09-30T08:55:14.658		3.55x	-53.05	50026.71	-20.54		
delta	I	2040-09-30T08:56:41.088		3.84x	-52.83	48300.35	-19.38		
gamma	I	2040-09-30T08:57:16.224		3.96x	-52.75	47628.15	-18.88		
eta	I	2040-09-30T08:57:40.403		4.04x	-52.69	47176.12	-18.51		
beta	I	2040-09-30T08:59:06.377		4.33x	-52.47	45642.67	-17.14		
alpha	I	2040-09-30T09:00:02.277		4.51x	-52.33	44706.58	-16.15		
4	I	2040-09-30T09:02:27.694		5.00	-51.96	42563.75	-13.36		
5	I	2040-09-30T09:02:58.773		5.11	-51.88	42164.48	-12.74		
6	I	2040-09-30T09:03:26.022		5.20	-51.81	41803.92	-12.09		

No planet occultations

6	E	2040-09-30T09:19:26.111	8.44	-49.24	41794.93	12.07
5	E	2040-09-30T09:19:55.887	8.54	-49.16	42158.61	12.72
4	E	2040-09-30T09:20:25.016	8.64	-49.07	42532.80	13.34
alpha	E	2040-09-30T09:22:49.426	9.13	-48.67	44685.11	16.11
beta	E	2040-09-30T09:23:48.727	9.33	-48.50	45660.00	17.11
eta	E	2040-09-30T09:25:13.735	9.62	-48.26	47176.12	18.47
gamma	E	2040-09-30T09:25:38.161	9.70	-48.19	47631.57	18.83
delta	E	2040-09-30T09:26:13.213	9.82	-48.09	48300.35	19.33
lambda	E	2040-09-30T09:27:39.901	10.12	-47.85	50026.71	20.48
epsilon	E	2040-09-30T09:28:43.125	10.33	-47.67	51346.12	21.08

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2040-09-30T09:14:21.140  
 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 : 659763434012615296  
 2Mass ID (if available) : 08365230+1909427  
 ICRS Star Coord at Epoch: 08h 36m 52.31997s +19:09:42.80921s  
 RUWE (>1.4 is poor) : 1.09  
 K magnitude : 11.654  
 G magnitude : 13.023  
 RP magnitude : 12.551  
 BP magnitude : 13.336  
 DUPflag : 0  
 Distance (au) : 19.023  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 21.23  
 Sun-Target sep (deg) : 60.59  
 Sun-Moon sep (deg) : 6.12  
 B (ring opening deg) : 40.42  
 PA of pole (deg) : 93.90  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.814  
 C/A sky separation (km) : 38821.6  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

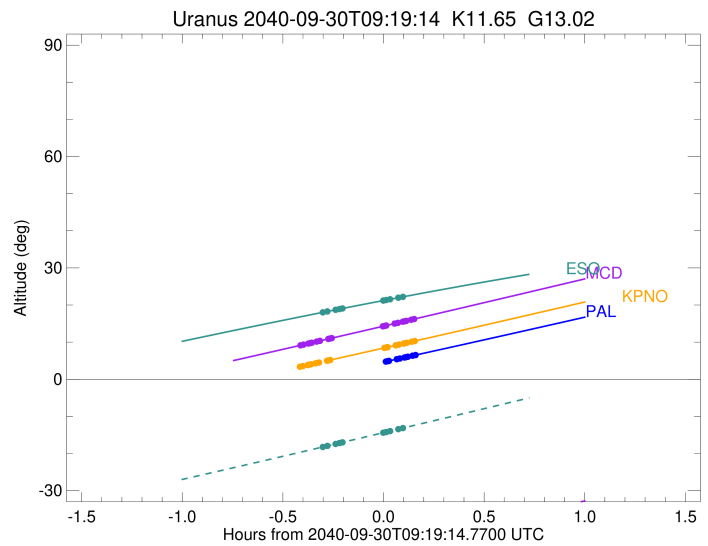
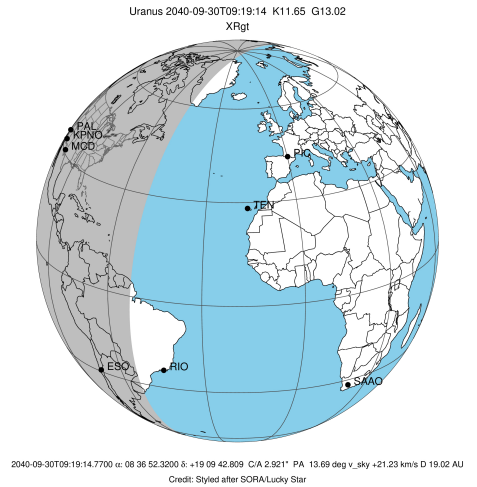


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2040-09-30T08:54:45.927		9.20	-49.05	50832.00	-20.82		
lambda	I	2040-09-30T08:55:25.299		9.34	-48.93	50026.71	-20.20		
delta	I	2040-09-30T08:56:53.318		9.64	-48.67	48300.35	-19.00		
gamma	I	2040-09-30T08:57:29.178		9.77	-48.57	47628.22	-18.48		
eta	I	2040-09-30T08:57:53.894		9.85	-48.49	47176.12	-18.10		
beta	I	2040-09-30T08:59:22.020		10.16	-48.23	45642.79	-16.68		
alpha	I	2040-09-30T09:00:19.642		10.35	-48.06	44706.05	-15.64		
4	I	2040-09-30T09:02:51.012		10.88	-47.61	42562.79	-12.70		
5	I	2040-09-30T09:03:23.738		10.99	-47.52	42163.63	-12.03		
6	I	2040-09-30T09:03:52.846		11.09	-47.43	41803.29	-11.33		

No planet occultations

6	E	2040-09-30T09:18:57.745	14.24	-44.66	41794.85	11.32
5	E	2040-09-30T09:19:29.404	14.35	-44.56	42158.09	12.01
4	E	2040-09-30T09:20:00.174	14.46	-44.46	42533.31	12.68
alpha	E	2040-09-30T09:22:30.517	14.99	-43.99	44685.21	15.61
beta	E	2040-09-30T09:23:31.560	15.20	-43.80	45659.70	16.64
eta	E	2040-09-30T09:24:58.716	15.50	-43.52	47176.12	18.06
gamma	E	2040-09-30T09:25:23.680	15.59	-43.44	47631.58	18.43
delta	E	2040-09-30T09:25:59.458	15.72	-43.33	48300.35	18.95
lambda	E	2040-09-30T09:27:27.738	16.03	-43.05	50026.71	20.14
epsilon	E	2040-09-30T09:28:31.796	16.25	-42.85	51342.36	20.76

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2040-09-30T09:16:36.800  
 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 : 659763434012615296  
 2Mass ID (if available) : 08365230+1909427  
 ICRS Star Coord at Epoch: 08h 36m 52.31997s +19:09:42.80921s  
 RUWE (>1.4 is poor) : 1.09  
 K magnitude : 11.654  
 G magnitude : 13.023  
 RP magnitude : 12.551  
 BP magnitude : 13.336  
 DUPflag : 0  
 Distance (au) : 19.023  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 21.23  
 Sun-Target sep (deg) : 60.59  
 Sun-Moon sep (deg) : 7.05  
 B (ring opening deg) : 40.42  
 PA of pole (deg) : 93.90  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.285  
 C/A sky separation (km) : 45327.8  
 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\_itrfr93\_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	2040-09-30T09:01:28.002		18.08	-18.17	50900.47	-14.29		
lambda	I	2040-09-30T09:02:32.382		18.27	-17.95	50026.71	-13.03		
delta	I	2040-09-30T09:04:59.799		18.71	-17.42	48300.35	-10.35		
gamma	I	2040-09-30T09:06:09.114		18.92	-17.18	47629.69	-9.00		
eta	I	2040-09-30T09:07:02.761		19.08	-16.99	47176.12	-7.91		

No planet occultations

eta	E	2040-09-30T09:19:08.194		21.19	-14.41	47176.12	7.90		
gamma	E	2040-09-30T09:20:02.080		21.35	-14.22	47631.34	8.99		
delta	E	2040-09-30T09:21:11.293		21.55	-13.97	48300.35	10.34		
lambda	E	2040-09-30T09:23:38.928		21.97	-13.44	50026.71	13.01		
epsilon	E	2040-09-30T09:25:08.227		22.22	-13.13	51254.73	14.26		