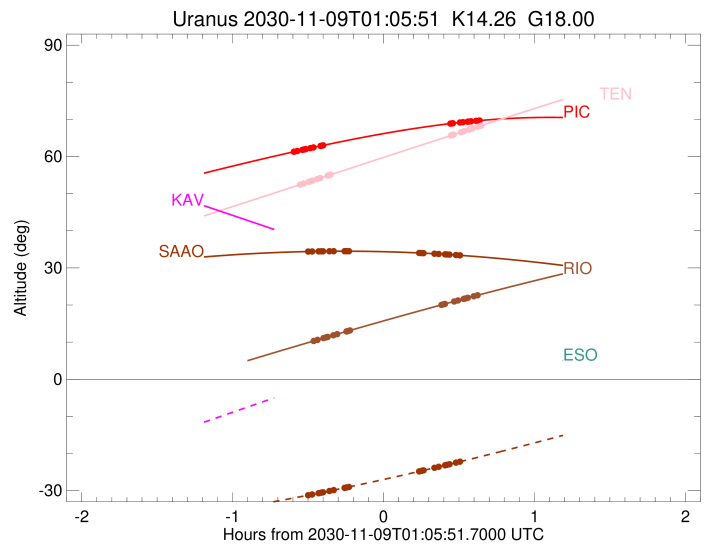
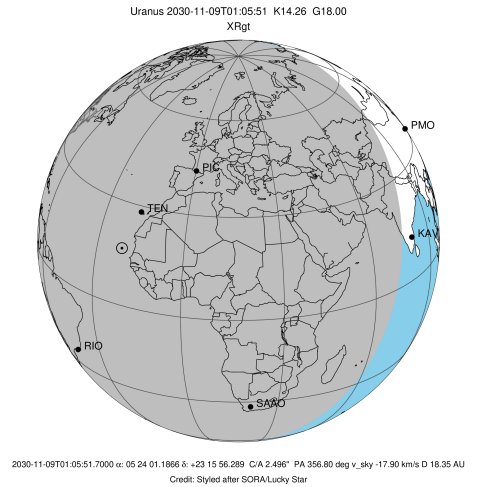




target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-11-09T01:06:53.470  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 3416316493041644544  
 2Mass ID (if available) : 05240115+2315564  
 ICRS Star Coord at Epoch: 05h 24m 01.18664s +23:15:56.28922s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.259  
 G magnitude : 17.999  
 RP magnitude : 16.953  
 BP magnitude : 19.150  
 DUPflag : 0  
 Distance (au) : 18.346  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.91  
 Sun-Target sep (deg) : 144.50  
 Sun-Moon sep (deg) : 48.28  
 B (ring opening deg) : 81.19  
 PA of pole (deg) : 23.96  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.332  
 C/A sky separation (km) : 31032.7  
 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

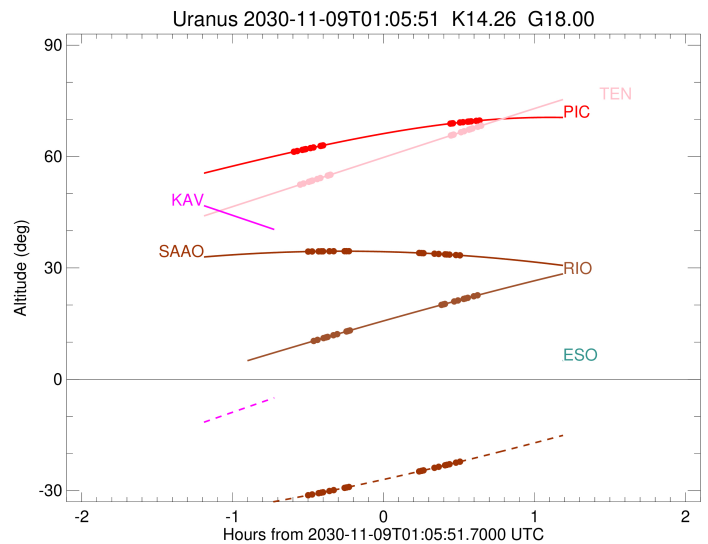
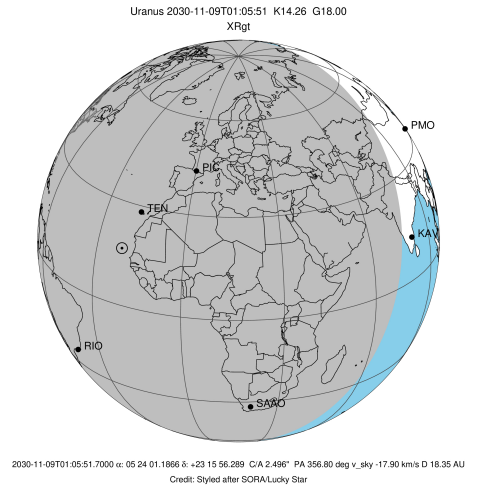


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-11-09T00:30:42.597		61.36	-62.16	50764.62	-14.32		
lambda	I	2030-11-09T00:31:34.267		61.49	-62.09	50026.71	-14.21		
delta	I	2030-11-09T00:33:37.144		61.80	-61.93	48300.35	-13.88		
gamma	I	2030-11-09T00:34:26.240		61.92	-61.86	47622.53	-13.73		
eta	I	2030-11-09T00:34:58.864		62.00	-61.82	47176.12	-13.63		
beta	I	2030-11-09T00:36:50.786		62.27	-61.66	45670.75	-13.27		
alpha	I	2030-11-09T00:38:05.758		62.46	-61.55	44685.94	-13.00		
4	I	2030-11-09T00:40:55.725		62.87	-61.30	42527.67	-12.33		
5	I	2030-11-09T00:41:26.116		62.94	-61.25	42164.32	-12.22		
6	I	2030-11-09T00:41:53.261		63.01	-61.21	41824.90	-12.10		

No planet occultations

6	E	2030-11-09T01:32:29.369		68.88	-55.18	41876.17	12.12		
5	E	2030-11-09T01:33:01.120		68.92	-55.11	42265.57	12.24		
4	E	2030-11-09T01:33:24.683		68.95	-55.05	42555.19	12.35		
alpha	E	2030-11-09T01:36:15.580		69.17	-54.65	44728.55	13.03		
beta	E	2030-11-09T01:37:27.706		69.26	-54.47	45678.16	13.30		
eta	E	2030-11-09T01:39:18.802		69.39	-54.21	47176.12	13.66		
gamma	E	2030-11-09T01:39:51.388		69.43	-54.13	47623.04	13.76		
delta	E	2030-11-09T01:40:40.330		69.48	-54.01	48300.35	13.91		
lambda	E	2030-11-09T01:42:42.904		69.61	-53.71	50026.71	14.25		
epsilon	E	2030-11-09T01:43:58.706		69.69	-53.52	51114.38	14.36		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-11-09T01:08:27.610  
 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 : 3416316493041644544  
 2Mass ID (if available) : 05240115+2315564  
 ICRS Star Coord at Epoch: 05h 24m 01.18664s +23:15:56.28922s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.259  
 G magnitude : 17.999  
 RP magnitude : 16.953  
 BP magnitude : 19.150  
 DUPflag : 0  
 Distance (au) : 18.346  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.91  
 Sun-Target sep (deg) : 144.50  
 Sun-Moon sep (deg) : 48.07  
 B (ring opening deg) : 81.19  
 PA of pole (deg) : 23.96  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.424  
 C/A sky separation (km) : 32250.0  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl1.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

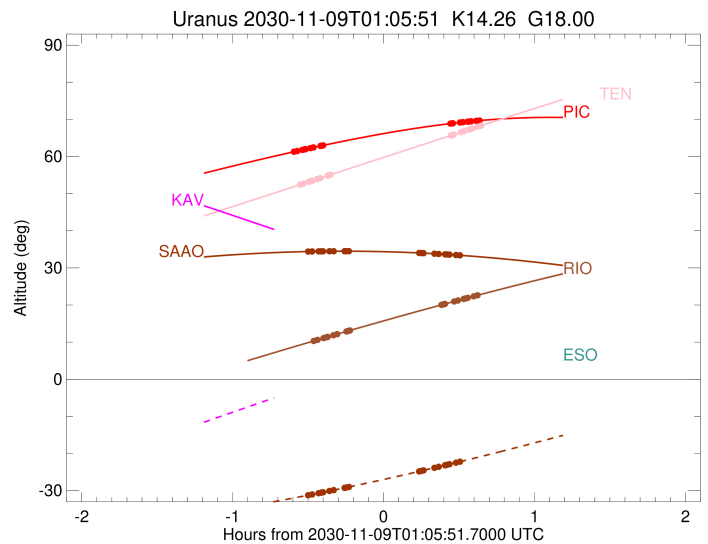
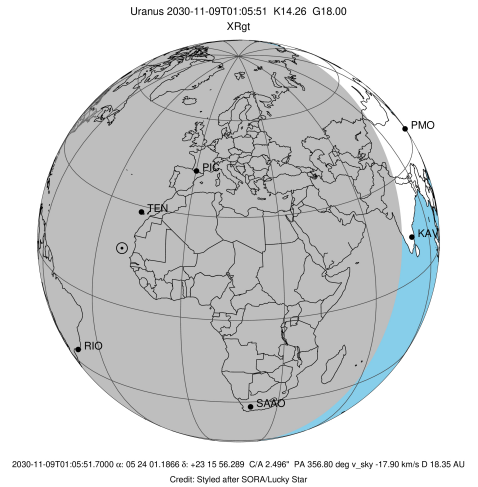


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-11-09T00:33:12.808		52.54	-78.05	50761.13	-13.96		
lambda	I	2030-11-09T00:34:05.590		52.73	-78.12	50026.71	-13.84		
delta	I	2030-11-09T00:36:11.992		53.20	-78.26	48300.35	-13.47		
gamma	I	2030-11-09T00:37:02.632		53.39	-78.31	47622.41	-13.31		
eta	I	2030-11-09T00:37:36.312		53.51	-78.34	47176.12	-13.19		
beta	I	2030-11-09T00:39:32.139		53.94	-78.44	45671.36	-12.79		
alpha	I	2030-11-09T00:40:50.077		54.22	-78.50	44686.31	-12.49		
4	I	2030-11-09T00:43:47.876		54.88	-78.60	42527.20	-11.73		
5	I	2030-11-09T00:44:19.677		55.00	-78.61	42165.97	-11.60		
6	I	2030-11-09T00:44:48.256		55.10	-78.62	41826.65	-11.46		

No planet occultations

6	E	2030-11-09T01:32:43.013		65.68	-74.97	41875.30	11.50		
5	E	2030-11-09T01:33:16.157		65.80	-74.89	42262.03	11.64		
4	E	2030-11-09T01:33:41.064		65.90	-74.83	42553.24	11.77		
alpha	E	2030-11-09T01:36:39.531		66.55	-74.36	44727.18	12.54		
beta	E	2030-11-09T01:37:54.509		66.82	-74.16	45678.58	12.84		
eta	E	2030-11-09T01:39:49.301		67.24	-73.85	47176.12	13.25		
gamma	E	2030-11-09T01:40:22.879		67.37	-73.76	47622.88	13.36		
delta	E	2030-11-09T01:41:13.272		67.55	-73.62	48300.35	13.52		
lambda	E	2030-11-09T01:43:19.124		68.01	-73.27	50026.71	13.90		
epsilon	E	2030-11-09T01:44:35.782		68.29	-73.05	51100.75	14.02		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-11-09T01:10:24.790  
 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 : 3416316493041644544  
 2Mass ID (if available) : 05240115+2315564  
 ICRS Star Coord at Epoch: 05h 24m 01.18664s +23:15:56.28922s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.259  
 G magnitude : 17.999  
 RP magnitude : 16.953  
 BP magnitude : 19.150  
 DUPflag : 0  
 Distance (au) : 18.346  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.91  
 Sun-Target sep (deg) : 144.50  
 Sun-Moon sep (deg) : 47.48  
 B (ring opening deg) : 81.19  
 PA of pole (deg) : 23.96  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.743  
 C/A sky separation (km) : 36496.1  
 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

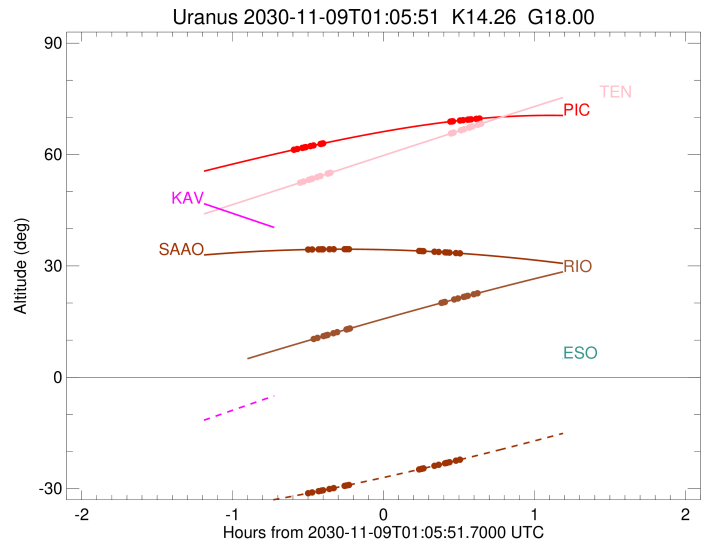
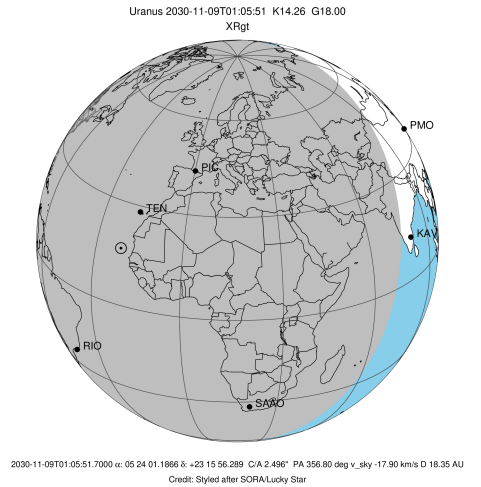


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-11-09T00:38:40.130		10.42	-41.03	50750.27	-12.42		
lambda	I	2030-11-09T00:39:38.766		10.62	-41.17	50026.71	-12.24		
delta	I	2030-11-09T00:42:02.947		11.09	-41.51	48300.35	-11.70		
gamma	I	2030-11-09T00:43:01.514		11.28	-41.65	47621.97	-11.46		
eta	I	2030-11-09T00:43:40.681		11.41	-41.74	47176.12	-11.30		
beta	I	2030-11-09T00:45:57.266		11.86	-42.06	45673.72	-10.70		
alpha	I	2030-11-09T00:47:31.415		12.17	-42.27	44688.26	-10.25		
4	I	2030-11-09T00:51:14.904		12.90	-42.77	42526.02	-9.04		
5	I	2030-11-09T00:51:55.416		13.03	-42.86	42174.28	-8.82		
6	I	2030-11-09T00:52:33.270		13.15	-42.95	41834.32	-8.59		

No planet occultations

6	E	2030-11-09T01:28:57.132		20.04	-47.10	41871.08	8.62		
5	E	2030-11-09T01:29:39.597		20.17	-47.16	42247.78	8.86		
4	E	2030-11-09T01:30:13.019		20.28	-47.22	42546.11	9.07		
alpha	E	2030-11-09T01:33:56.884		20.96	-47.55	44721.97	10.29		
beta	E	2030-11-09T01:35:27.915		21.23	-47.69	45679.86	10.75		
eta	E	2030-11-09T01:37:43.207		21.64	-47.88	47176.12	11.36		
gamma	E	2030-11-09T01:38:22.196		21.75	-47.93	47622.37	11.53		
delta	E	2030-11-09T01:39:20.402		21.93	-48.01	48300.35	11.77		
lambda	E	2030-11-09T01:41:43.732		22.36	-48.20	50026.71	12.31		
epsilon	E	2030-11-09T01:43:06.136		22.60	-48.31	51053.43	12.50		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-11-09T01:05:44.770  
 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 : 3416316493041644544  
 2Mass ID (if available) : 05240115+2315564  
 ICRS Star Coord at Epoch: 05h 24m 01.18664s +23:15:56.28922s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.259  
 G magnitude : 17.999  
 RP magnitude : 16.953  
 BP magnitude : 19.150  
 DUPflag : 0  
 Distance (au) : 18.346  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.91  
 Sun-Target sep (deg) : 144.50  
 Sun-Moon sep (deg) : 48.21  
 B (ring opening deg) : 81.19  
 PA of pole (deg) : 23.96  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.898  
 C/A sky separation (km) : 38555.3  
 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



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	2030-11-09T00:36:29.618		34.41	-31.16	50746.14	-11.74		
lambda	I	2030-11-09T00:37:31.483		34.43	-31.03	50026.71	-11.50		
delta	I	2030-11-09T00:40:05.898		34.46	-30.68	48300.35	-10.84		
gamma	I	2030-11-09T00:41:09.331		34.47	-30.54	47621.73	-10.55		
eta	I	2030-11-09T00:41:51.977		34.47	-30.44	47176.12	-10.35		
beta	I	2030-11-09T00:44:22.589		34.49	-30.10	45675.07	-9.58		
alpha	I	2030-11-09T00:46:08.684		34.50	-29.85	44689.86	-9.00		
4	I	2030-11-09T00:50:31.900		34.50	-29.24	42525.99	-7.37		
5	I	2030-11-09T00:51:21.060		34.50	-29.12	42181.02	-7.07		
6	I	2030-11-09T00:52:09.039		34.50	-29.01	41839.66	-6.73		

No planet occultations

6	E	2030-11-09T01:20:05.445		34.02	-24.81	41868.05	6.73		
5	E	2030-11-09T01:20:58.225		34.00	-24.67	42239.44	7.07		
4	E	2030-11-09T01:21:40.444		33.97	-24.56	42542.47	7.37		
alpha	E	2030-11-09T01:26:04.907		33.82	-23.86	44719.27	9.00		
beta	E	2030-11-09T01:27:48.286		33.75	-23.58	45680.35	9.59		
eta	E	2030-11-09T01:30:18.275		33.65	-23.18	47176.12	10.35		
gamma	E	2030-11-09T01:31:00.944		33.62	-23.06	47622.14	10.55		
delta	E	2030-11-09T01:32:04.316		33.58	-22.89	48300.35	10.85		
lambda	E	2030-11-09T01:34:38.672		33.46	-22.47	50026.71	11.51		
epsilon	E	2030-11-09T01:36:04.794		33.40	-22.23	51032.75	11.74		