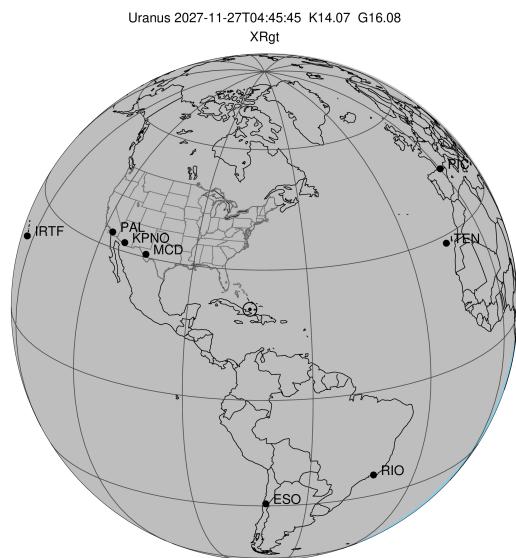


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2027-11-27T04:45:45.870  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 145328778331898368  
 2Mass ID (if available) : 04233484+2129482

ICRS Star Coord at Epoch: 04h 23m 34.84308s +21:29:48.13154s

RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.073  
 G magnitude : 16.084  
 RP magnitude : 15.394  
 BP magnitude : 16.595  
 DUPflag : 0  
 Distance (au) : 18.378  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.42  
 Sun-Target sep (deg) : 176.64  
 Sun-Moon sep (deg) : 164.45  
 B (ring opening deg) : 77.46  
 PA of pole (deg) : -61.64

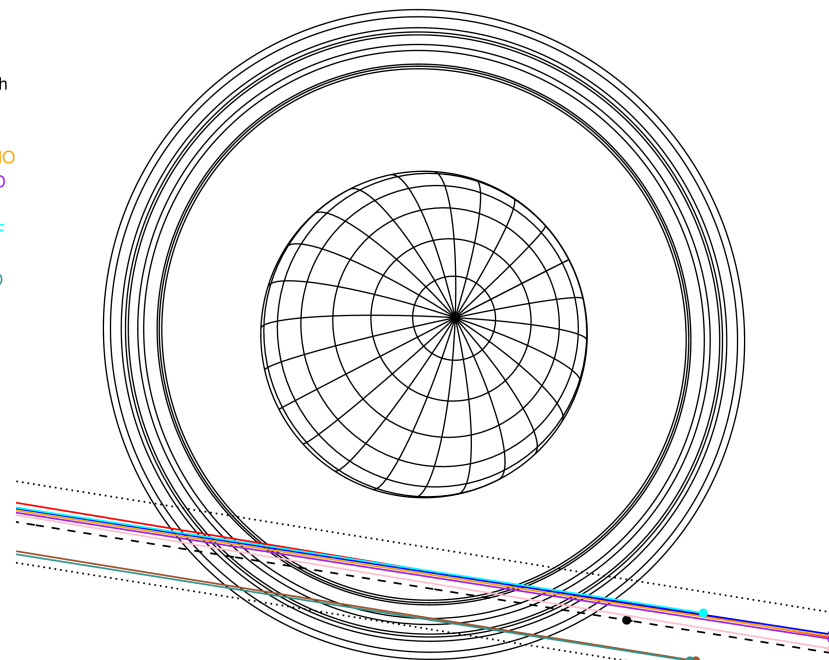
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2027-11-27T04:45:45.8700 ex: 04 23 34.8431 s: +21 29 48.132 C/A 2.931'' PA 350.87 deg v\_sky -23.42 km/s D 18.38 AU  
 Credit: Styled after SORA/Lucky Star

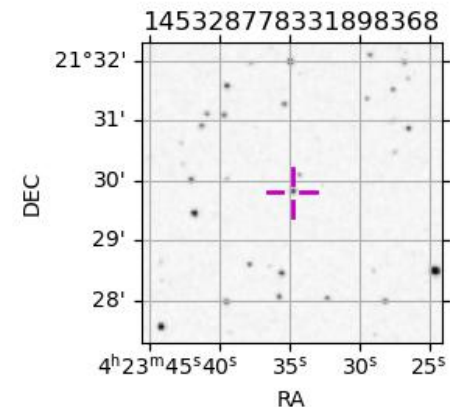
Uranus 2027-11-27T04:45:45 K14.07 G16.08 XRgt

Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO

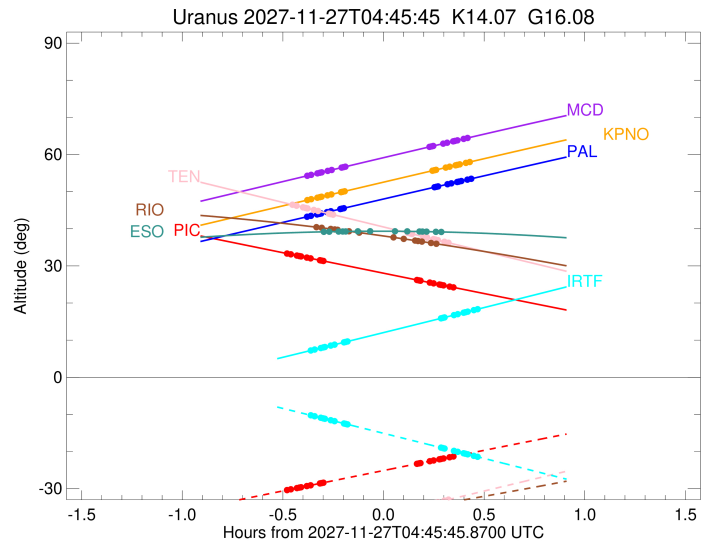
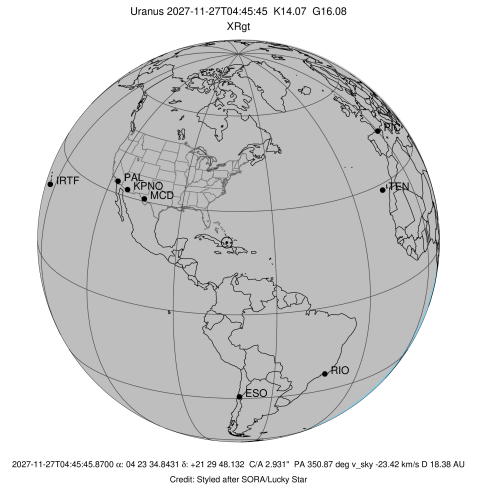


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	NOV 27 04:17 - NOV 27 05:06	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	NOV 27 04:23 - NOV 27 05:11	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	NOV 27 04:23 - NOV 27 05:11	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	NOV 27 04:23 - NOV 27 05:10	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	NOV 27 04:19 - NOV 27 05:04	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	NOV 27 04:24 - NOV 27 05:13	PnnRie
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++		+++++	NOV 27 04:26 - NOV 27 05:01	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	NOV 27 04:28 - NOV 27 05:02	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



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2027-11-27T04:42:23.630  
 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 : 145328778331898368  
 2Mass ID (if available) : 04233484+2129482  
 ICRS Star Coord at Epoch: 04h 23m 34.84308s +21:29:48.13154s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.073  
 G magnitude : 16.084  
 RP magnitude : 15.394  
 BP magnitude : 16.595  
 DUPflag : 0  
 Distance (au) : 18.378  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.42  
 Sun-Target sep (deg) : 176.64  
 Sun-Moon sep (deg) : 165.11  
 B (ring opening deg) : 77.46  
 PA of pole (deg) : -61.64  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.732  
 C/A sky separation (km) : 36418.6  
 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

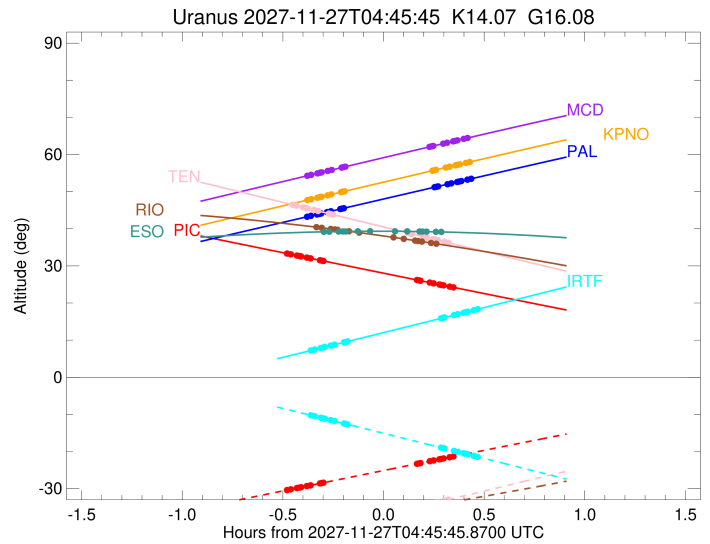
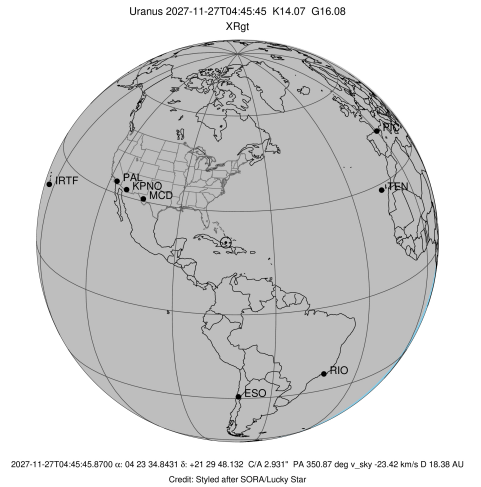


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-27T04:17:20.148		33.27	-30.33	50834.82	-16.45		
lambda	I	2027-11-27T04:18:09.468		33.11	-30.18	50026.71	-16.23		
delta	I	2027-11-27T04:19:58.141		32.78	-29.85	48300.35	-15.52		
gamma	I	2027-11-27T04:20:41.805		32.65	-29.72	47629.16	-15.22		
eta	I	2027-11-27T04:21:11.791		32.55	-29.62	47176.12	-15.00		
beta	I	2027-11-27T04:22:55.277		32.24	-29.31	45664.83	-14.20		
alpha	I	2027-11-27T04:24:00.855		32.04	-29.11	44751.69	-13.64		
4	I	2027-11-27T04:26:51.098		31.51	-28.59	42560.68	-12.08		
5	I	2027-11-27T04:27:23.615		31.41	-28.49	42175.26	-11.75		
6	I	2027-11-27T04:27:56.301		31.31	-28.39	41795.42	-11.38		

No planet occultations

6	E	2027-11-27T04:55:40.532		26.22	-23.32	41808.10	11.36		
5	E	2027-11-27T04:56:18.683		26.10	-23.21	42249.98	11.73		
4	E	2027-11-27T04:56:49.007		26.01	-23.12	42604.53	12.06		
alpha	E	2027-11-27T04:59:33.684		25.51	-22.62	44723.46	13.62		
beta	E	2027-11-27T05:00:42.417		25.30	-22.41	45681.10	14.17		
eta	E	2027-11-27T05:02:25.019		24.98	-22.10	47176.12	14.96		
gamma	E	2027-11-27T05:02:54.634		24.89	-22.01	47622.44	15.18		
delta	E	2027-11-27T05:03:38.847		24.76	-21.88	48300.35	15.49		
lambda	E	2027-11-27T05:05:27.802		24.43	-21.55	50026.71	16.19		
epsilon	E	2027-11-27T05:06:19.765		24.27	-21.39	50876.20	16.40		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2027-11-27T04:48:03.820  
 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 : 145328778331898368  
 2Mass ID (if available) : 04233484+2129482  
 ICRS Star Coord at Epoch: 04h 23m 34.84308s +21:29:48.13154s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.073  
 G magnitude : 16.084  
 RP magnitude : 15.394  
 BP magnitude : 16.595  
 DUPflag : 0  
 Distance (au) : 18.378  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.42  
 Sun-Target sep (deg) : 176.64  
 Sun-Moon sep (deg) : 164.06  
 B (ring opening deg) : 77.46  
 PA of pole (deg) : -61.64  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.753  
 C/A sky separation (km) : 36698.8  
 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

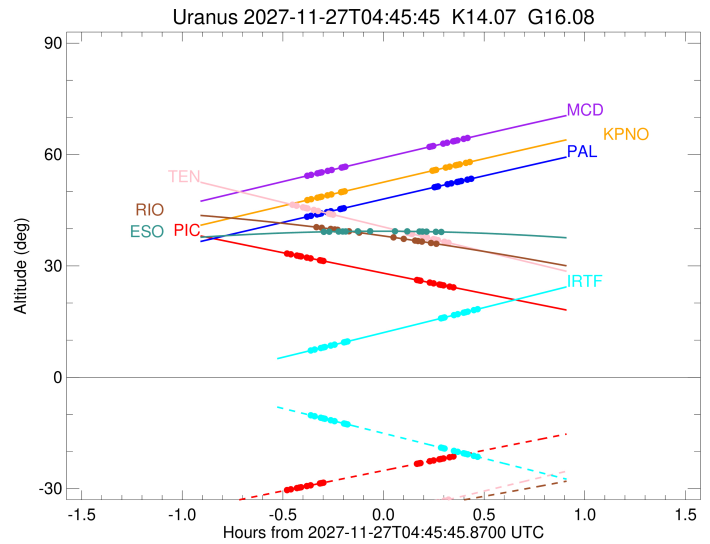
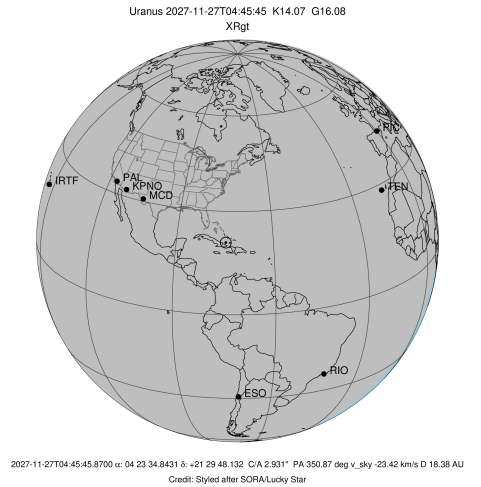


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-27T04:23:18.509		43.31	-46.09	50835.37	-16.35		
lambda	I	2027-11-27T04:24:08.145		43.48	-46.26	50026.71	-16.14		
delta	I	2027-11-27T04:25:57.541		43.86	-46.64	48300.35	-15.41		
gamma	I	2027-11-27T04:26:41.540		44.02	-46.80	47629.16	-15.09		
eta	I	2027-11-27T04:27:11.774		44.12	-46.90	47176.12	-14.87		
beta	I	2027-11-27T04:28:56.245		44.49	-47.27	45664.83	-14.05		
alpha	I	2027-11-27T04:30:02.574		44.72	-47.50	44751.68	-13.48		
4	I	2027-11-27T04:32:55.402		45.32	-48.10	42560.82	-11.85		
5	I	2027-11-27T04:33:28.555		45.44	-48.21	42175.45	-11.51		
6	I	2027-11-27T04:34:01.959		45.56	-48.33	41795.39	-11.13		

No planet occultations

6	E	2027-11-27T05:00:54.282		51.18	-53.90	41807.37	11.15		
5	E	2027-11-27T05:01:32.997		51.31	-54.04	42248.12	11.53		
4	E	2027-11-27T05:02:03.916		51.42	-54.14	42603.81	11.87		
alpha	E	2027-11-27T05:04:50.625		52.00	-54.72	44724.16	13.50		
beta	E	2027-11-27T05:05:59.812		52.24	-54.95	45681.05	14.08		
eta	E	2027-11-27T05:07:42.952		52.60	-55.31	47176.12	14.90		
gamma	E	2027-11-27T05:08:12.682		52.70	-55.41	47622.51	15.13		
delta	E	2027-11-27T05:08:57.023		52.85	-55.56	48300.35	15.45		
lambda	E	2027-11-27T05:10:46.162		53.23	-55.93	50026.71	16.18		
epsilon	E	2027-11-27T05:11:37.827		53.41	-56.11	50870.85	16.40		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2027-11-27T04:47:52.970  
 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 : 145328778331898368  
 2Mass ID (if available) : 04233484+2129482  
 ICRS Star Coord at Epoch: 04h 23m 34.84308s +21:29:48.13154s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.073  
 G magnitude : 16.084  
 RP magnitude : 15.394  
 BP magnitude : 16.595  
 DUPflag : 0  
 Distance (au) : 18.378  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.42  
 Sun-Target sep (deg) : 176.64  
 Sun-Moon sep (deg) : 164.12  
 B (ring opening deg) : 77.46  
 PA of pole (deg) : -61.64  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.776  
 C/A sky separation (km) : 37008.1  
 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

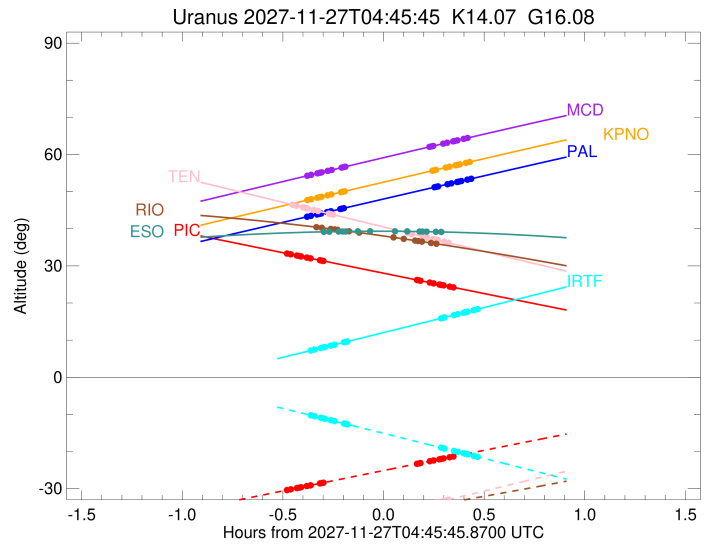
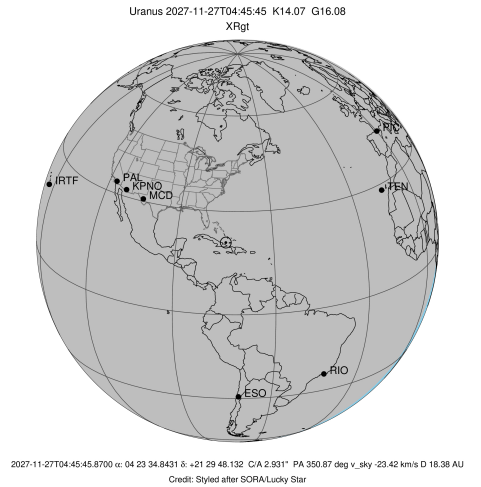


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-27T04:23:23.289		47.80	-50.64	50833.03	-16.22		
lambda	I	2027-11-27T04:24:13.215		47.98	-50.81	50026.71	-15.99		
delta	I	2027-11-27T04:26:03.705		48.37	-51.20	48300.35	-15.24		
gamma	I	2027-11-27T04:26:48.210		48.53	-51.36	47629.11	-14.92		
eta	I	2027-11-27T04:27:18.810		48.64	-51.47	47176.12	-14.69		
beta	I	2027-11-27T04:29:04.716		49.01	-51.84	45665.07	-13.84		
alpha	I	2027-11-27T04:30:12.157		49.25	-52.08	44751.59	-13.24		
4	I	2027-11-27T04:33:08.633		49.88	-52.70	42561.49	-11.55		
5	I	2027-11-27T04:33:42.685		50.00	-52.82	42176.31	-11.19		
6	I	2027-11-27T04:34:17.151		50.12	-52.94	41795.27	-10.79		

No planet occultations

6	E	2027-11-27T05:00:16.928		55.63	-58.39	41806.88	10.81		
5	E	2027-11-27T05:00:56.704		55.77	-58.53	42246.90	11.21		
4	E	2027-11-27T05:01:28.532		55.88	-58.64	42603.34	11.57		
alpha	E	2027-11-27T05:04:18.915		56.48	-59.23	44724.58	13.27		
beta	E	2027-11-27T05:05:29.220		56.72	-59.48	45681.02	13.87		
eta	E	2027-11-27T05:07:13.812		57.09	-59.84	47176.12	14.72		
gamma	E	2027-11-27T05:07:43.913		57.20	-59.94	47622.55	14.95		
delta	E	2027-11-27T05:08:28.766		57.35	-60.10	48300.35	15.28		
lambda	E	2027-11-27T05:10:19.019		57.74	-60.48	50026.71	16.03		
epsilon	E	2027-11-27T05:11:10.986		57.92	-60.65	50868.26	16.26		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2027-11-27T04:47:33.020  
 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 : 145328778331898368  
 2Mass ID (if available) : 04233484+2129482  
 ICRS Star Coord at Epoch: 04h 23m 34.84308s +21:29:48.13154s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.073  
 G magnitude : 16.084  
 RP magnitude : 15.394  
 BP magnitude : 16.595  
 DUPflag : 0  
 Distance (au) : 18.378  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.42  
 Sun-Target sep (deg) : 176.64  
 Sun-Moon sep (deg) : 164.22  
 B (ring opening deg) : 77.46  
 PA of pole (deg) : -61.64  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.804  
 C/A sky separation (km) : 37378.3  
 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



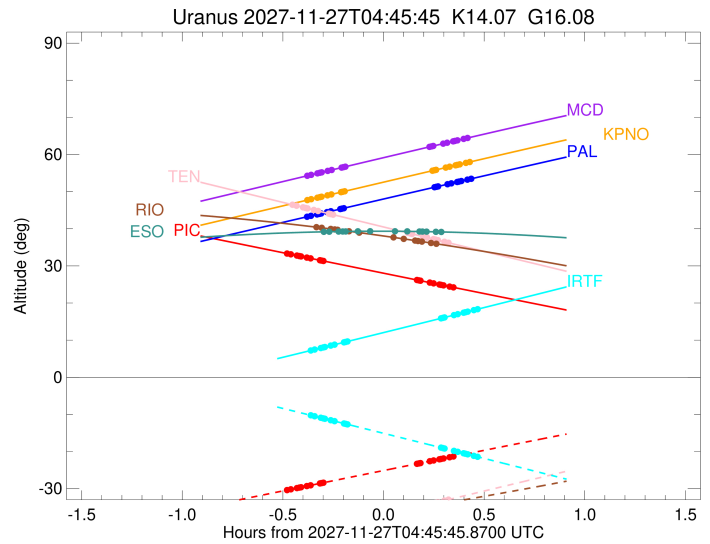
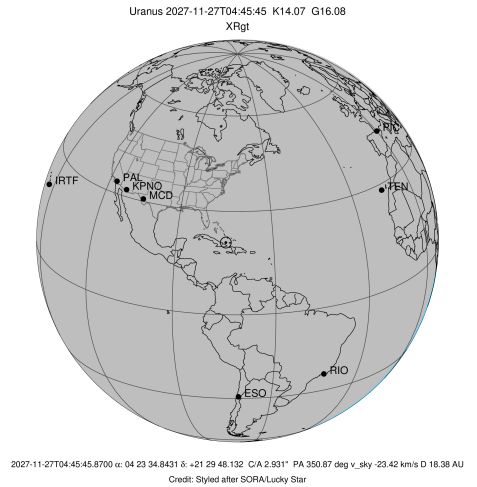
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-27T04:23:22.460		54.35	-57.23	50830.20	-16.05		
lambda	I	2027-11-27T04:24:12.748		54.53	-57.40	50026.71	-15.81		
delta	I	2027-11-27T04:26:04.604		54.93	-57.80	48300.35	-15.04		
gamma	I	2027-11-27T04:26:49.744		55.09	-57.96	47629.06	-14.70		
eta	I	2027-11-27T04:27:20.805		55.21	-58.07	47176.12	-14.46		
beta	I	2027-11-27T04:29:08.531		55.59	-58.45	45665.36	-13.58		
alpha	I	2027-11-27T04:30:17.396		55.84	-58.70	44751.47	-12.95		
4	I	2027-11-27T04:33:18.628		56.49	-59.34	42562.33	-11.18		
5	I	2027-11-27T04:33:53.876		56.61	-59.46	42177.40	-10.80		
6	I	2027-11-27T04:34:29.768		56.74	-59.59	41795.14	-10.37		

No planet occultations

6	E	2027-11-27T04:59:23.886		62.05	-64.82	41806.30	10.38		
5	E	2027-11-27T05:00:05.089		62.20	-64.96	42245.39	10.81		
4	E	2027-11-27T05:00:38.125		62.31	-65.07	42602.75	11.19		
alpha	E	2027-11-27T05:03:33.309		62.93	-65.67	44725.08	12.97		
beta	E	2027-11-27T05:04:45.048		63.18	-65.92	45680.98	13.60		
eta	E	2027-11-27T05:06:31.490		63.55	-66.29	47176.12	14.49		
gamma	E	2027-11-27T05:07:02.061		63.66	-66.39	47622.60	14.73		
delta	E	2027-11-27T05:07:47.561		63.82	-66.55	48300.35	15.07		
lambda	E	2027-11-27T05:09:39.214		64.21	-66.93	50026.71	15.85		
epsilon	E	2027-11-27T05:10:31.568		64.39	-67.10	50865.20	16.08		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2027-11-27T04:42:29.920  
 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 : 145328778331898368  
 2Mass ID (if available) : 04233484+2129482  
 ICRS Star Coord at Epoch: 04h 23m 34.84308s +21:29:48.13154s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.073  
 G magnitude : 16.084  
 RP magnitude : 15.394  
 BP magnitude : 16.595  
 DUPflag : 0  
 Distance (au) : 18.378  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.42  
 Sun-Target sep (deg) : 176.64  
 Sun-Moon sep (deg) : 165.22  
 B (ring opening deg) : 77.46  
 PA of pole (deg) : -61.64  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.872  
 C/A sky separation (km) : 38285.2  
 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\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

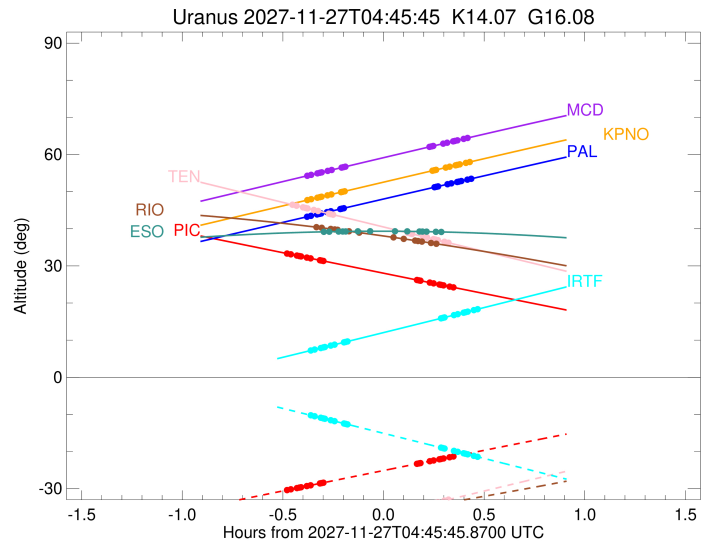
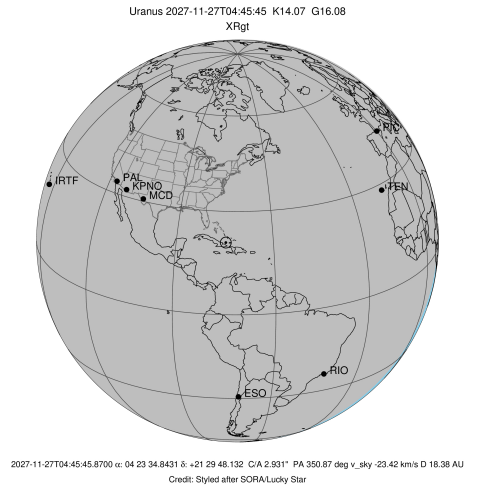


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-27T04:18:59.915		46.39	-43.08	50821.34	-15.54		
lambda	I	2027-11-27T04:19:51.330		46.21	-42.89	50026.71	-15.28		
delta	I	2027-11-27T04:21:47.475		45.78	-42.46	48300.35	-14.43		
gamma	I	2027-11-27T04:22:34.599		45.60	-42.29	47628.87	-14.06		
eta	I	2027-11-27T04:23:07.098		45.48	-42.17	47176.12	-13.80		
beta	I	2027-11-27T04:25:00.494		45.07	-41.76	45666.25	-12.82		
alpha	I	2027-11-27T04:26:13.825		44.80	-41.49	44751.04	-12.13		
4	I	2027-11-27T04:29:30.235		44.07	-40.77	42564.90	-10.10		
5	I	2027-11-27T04:30:09.404		43.93	-40.62	42180.85	-9.66		
6	I	2027-11-27T04:30:50.099		43.78	-40.48	41794.86	-9.16		

No planet occultations

6	E	2027-11-27T04:52:55.894		38.91	-35.63	41805.00	9.15		
5	E	2027-11-27T04:53:42.032		38.74	-35.46	42241.99	9.65		
4	E	2027-11-27T04:54:19.048		38.61	-35.33	42601.41	10.09		
alpha	E	2027-11-27T04:57:29.913		37.91	-34.63	44726.10	12.10		
beta	E	2027-11-27T04:58:46.371		37.63	-34.35	45680.88	12.80		
eta	E	2027-11-27T05:00:38.888		37.22	-33.94	47176.12	13.77		
gamma	E	2027-11-27T05:01:11.017		37.10	-33.83	47622.69	14.03		
delta	E	2027-11-27T05:01:58.688		36.93	-33.65	48300.35	14.40		
lambda	E	2027-11-27T05:03:55.114		36.50	-33.23	50026.71	15.24		
epsilon	E	2027-11-27T05:04:49.131		36.30	-33.03	50859.87	15.50		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2027-11-27T04:49:34.900  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : IRTF  
 Location : Mauna Kea/IRTF  
 Latitude (deg) : 19.82622  
 E. Longitude (deg) : 204.52800  
 Altitude (km) : 4.168  
 Gaia source ID : 145328778331898368  
 2Mass ID (if available) : 04233484+2129482  
 ICRS Star Coord at Epoch: 04h 23m 34.84308s +21:29:48.13154s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.073  
 G magnitude : 16.084  
 RP magnitude : 15.394  
 BP magnitude : 16.595  
 DUPflag : 0  
 Distance (au) : 18.378  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.42  
 Sun-Target sep (deg) : 176.64  
 Sun-Moon sep (deg) : 163.63  
 B (ring opening deg) : 77.46  
 PA of pole (deg) : -61.64  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.736  
 C/A sky separation (km) : 36471.4  
 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

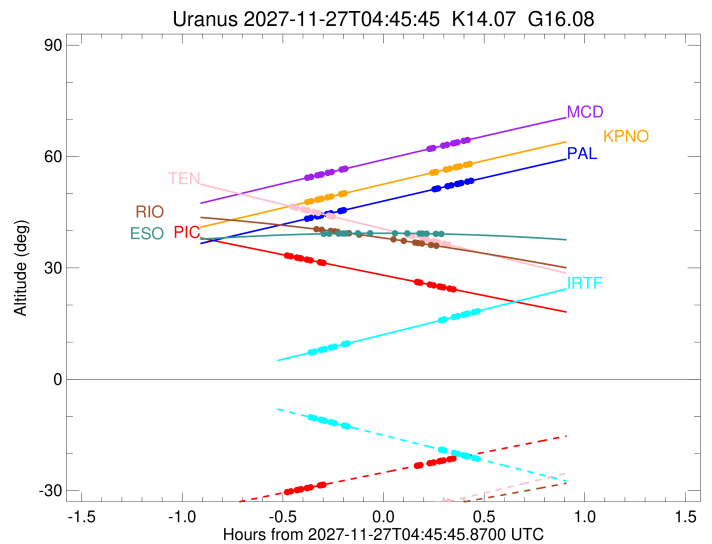
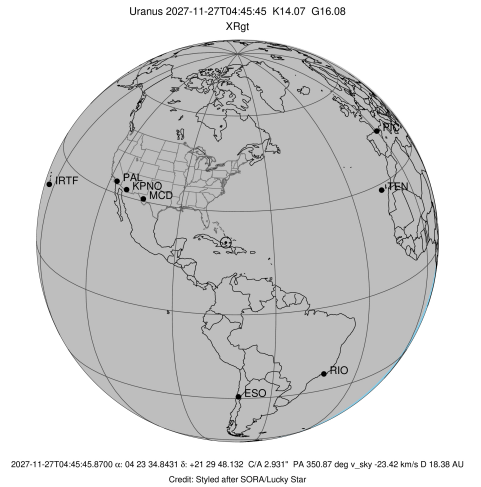


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-27T04:24:24.807		7.29	-10.32	50837.26	-16.30		
lambda	I	2027-11-27T04:25:14.706		7.47	-10.50	50026.71	-16.09		
delta	I	2027-11-27T04:27:04.327		7.87	-10.91	48300.35	-15.39		
gamma	I	2027-11-27T04:27:48.368		8.04	-11.07	47629.20	-15.08		
eta	I	2027-11-27T04:28:18.619		8.15	-11.18	47176.12	-14.87		
beta	I	2027-11-27T04:30:03.029		8.54	-11.57	45664.65	-14.08		
alpha	I	2027-11-27T04:31:09.177		8.78	-11.82	44751.75	-13.52		
4	I	2027-11-27T04:34:01.037		9.42	-12.46	42560.30	-11.96		
5	I	2027-11-27T04:34:33.871		9.54	-12.58	42174.81	-11.63		
6	I	2027-11-27T04:35:06.848		9.66	-12.70	41795.48	-11.27		

No planet occultations

6	E	2027-11-27T05:02:51.023		15.86	-18.94	41807.70	11.29		
5	E	2027-11-27T05:03:29.331		16.01	-19.08	42248.93	11.66		
4	E	2027-11-27T05:03:59.885		16.12	-19.20	42604.12	11.99		
alpha	E	2027-11-27T05:06:45.415		16.74	-19.82	44723.90	13.56		
beta	E	2027-11-27T05:07:54.379		17.00	-20.08	45681.07	14.12		
eta	E	2027-11-27T05:09:37.328		17.39	-20.47	47176.12	14.92		
gamma	E	2027-11-27T05:10:07.034		17.50	-20.58	47622.49	15.14		
delta	E	2027-11-27T05:10:51.368		17.67	-20.75	48300.35	15.44		
lambda	E	2027-11-27T05:12:40.589		18.08	-21.16	50026.71	16.16		
epsilon	E	2027-11-27T05:13:32.432		18.27	-21.36	50872.44	16.37		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2027-11-27T04:44:20.650  
 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 : 145328778331898368  
 2Mass ID (if available) : 04233484+2129482  
 ICRS Star Coord at Epoch: 04h 23m 34.84308s +21:29:48.13154s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.073  
 G magnitude : 16.084  
 RP magnitude : 15.394  
 BP magnitude : 16.595  
 DUPflag : 0  
 Distance (au) : 18.378  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.42  
 Sun-Target sep (deg) : 176.64  
 Sun-Moon sep (deg) : 165.08  
 B (ring opening deg) : 77.46  
 PA of pole (deg) : -61.64  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.279  
 C/A sky separation (km) : 43713.0  
 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



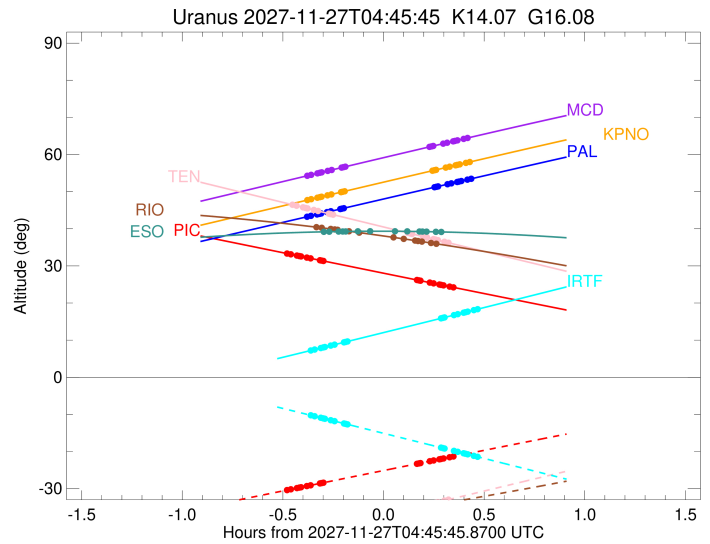
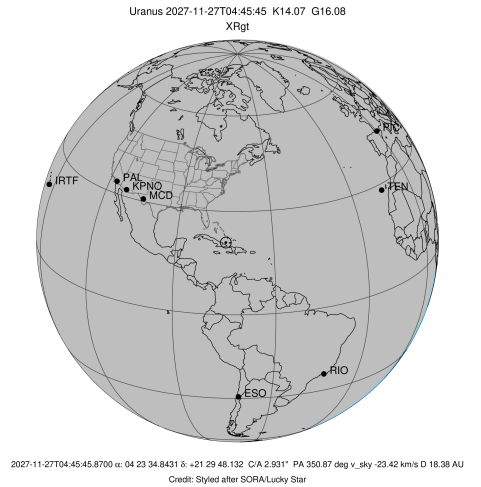
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-27T04:26:17.301		40.38	-39.13	50783.02	-11.90		
lambda	I	2027-11-27T04:27:22.011		40.26	-39.00	50026.71	-11.40		
delta	I	2027-11-27T04:30:04.372		39.95	-38.65	48300.35	-9.84		
gamma	I	2027-11-27T04:31:15.347		39.82	-38.50	47627.72	-9.11		
eta	I	2027-11-27T04:32:06.451		39.72	-38.39	47176.12	-8.56		
beta	I	2027-11-27T04:35:29.075		39.33	-37.96	45671.72	-6.26		
alpha	I	2027-11-27T04:38:28.345		38.97	-37.56	44745.61	-4.03		

No planet occultations

alpha	E	2027-11-27T04:48:45.942		37.68	-36.14	44737.37	4.03		
beta	E	2027-11-27T04:51:48.228		37.28	-35.71	45678.86	6.26		
eta	E	2027-11-27T04:55:09.877		36.83	-35.22	47176.12	8.56		
gamma	E	2027-11-27T04:56:00.583		36.71	-35.10	47623.73	9.10		
delta	E	2027-11-27T04:57:12.055		36.55	-34.92	48300.35	9.83		
lambda	E	2027-11-27T04:59:54.571		36.18	-34.52	50026.71	11.39		
epsilon	E	2027-11-27T05:01:01.708		36.02	-34.35	50811.24	11.89		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2027-11-27T04:46:12.190  
 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 : 145328778331898368  
 2Mass ID (if available) : 04233484+2129482  
 ICRS Star Coord at Epoch: 04h 23m 34.84308s +21:29:48.13154s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.073  
 G magnitude : 16.084  
 RP magnitude : 15.394  
 BP magnitude : 16.595  
 DUPflag : 0  
 Distance (au) : 18.378  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.42  
 Sun-Target sep (deg) : 176.64  
 Sun-Moon sep (deg) : 164.72  
 B (ring opening deg) : 77.46  
 PA of pole (deg) : -61.64  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.302  
 C/A sky separation (km) : 44007.4  
 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	2027-11-27T04:28:30.812		39.19	-39.83	50781.51	-11.65		
lambda	I	2027-11-27T04:29:36.851		39.21	-39.83	50026.71	-11.13		
delta	I	2027-11-27T04:32:23.932		39.25	-39.83	48300.35	-9.51		
gamma	I	2027-11-27T04:33:37.664		39.27	-39.82	47627.65	-8.73		
eta	I	2027-11-27T04:34:31.114		39.28	-39.82	47176.12	-8.16		
beta	I	2027-11-27T04:38:08.483		39.32	-39.79	45672.11	-5.65		
alpha	I	2027-11-27T04:41:43.102		39.34	-39.75	44744.72	-2.95		

No planet occultations

alpha	E	2027-11-27T04:49:13.874		39.33	-39.62	44738.72	2.95		
beta	E	2027-11-27T04:52:51.418		39.30	-39.54	45678.57	5.65		
eta	E	2027-11-27T04:56:27.670		39.26	-39.43	47176.12	8.16		
gamma	E	2027-11-27T04:57:20.679		39.25	-39.41	47623.83	8.73		
delta	E	2027-11-27T04:58:34.843		39.23	-39.37	48300.35	9.51		
lambda	E	2027-11-27T05:01:21.910		39.18	-39.27	50026.71	11.13		
epsilon	E	2027-11-27T05:02:30.193		39.16	-39.23	50807.93	11.66		