

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-11-30T05:19:39.380  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3424861450735391616  
 2Mass ID (if available) : 06000605+2338550

ICRS Star Coord at Epoch: 06h 00m 06.05589s +23:38:55.07328s

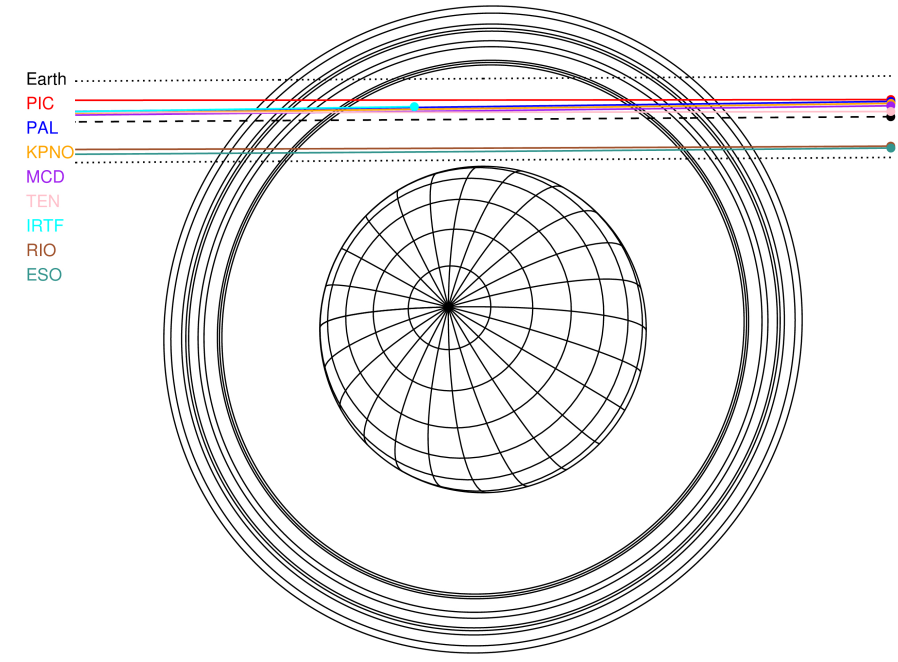
RUWE (>1.4 is poor) : 1.63  
 K magnitude : 13.715  
 G magnitude : 16.171  
 RP magnitude : 15.359  
 BP magnitude : 16.801  
 DUPflag : 0  
 Distance (au) : 18.105  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.27  
 Sun-Target sep (deg) : 158.07  
 Sun-Moon sep (deg) : 126.30  
 B (ring opening deg) : 75.33  
 PA of pole (deg) : 57.02

#	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



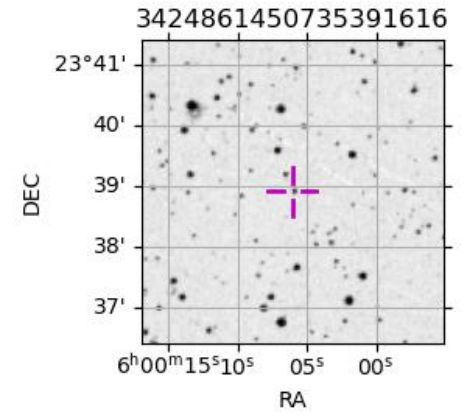
2032-11-30T05:19:39.3800 ra: 06 00 06.05589 s: +23 38 55.073 C/A 2.515° PA 180.36 deg v\_sky -21.27 km/s D 18.10 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2032-11-30T05:19:39 K13.71 G16.17 XRgt

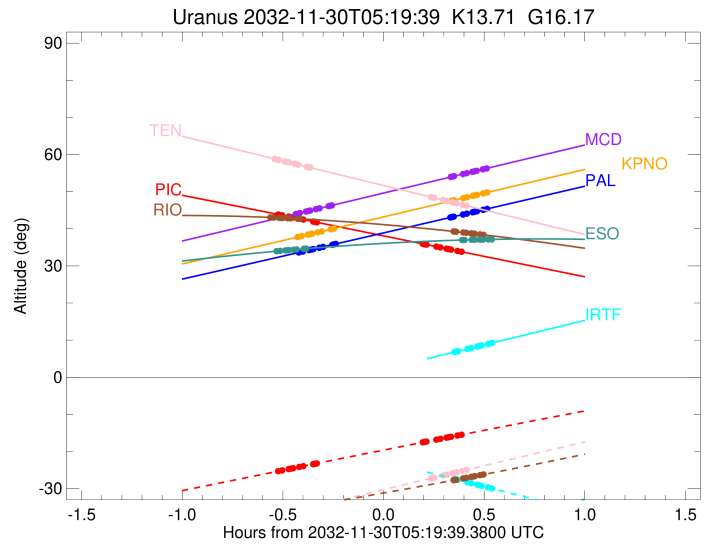
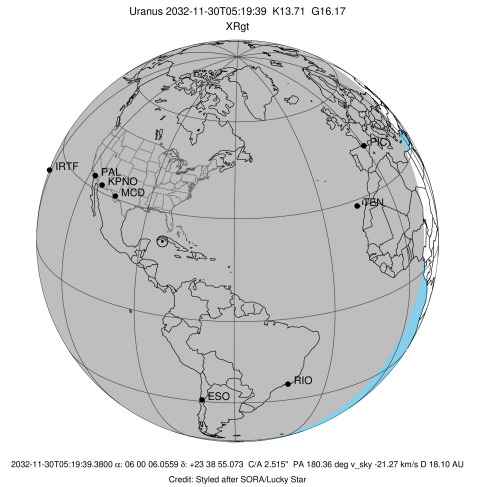


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	NOV 30 04:47 - NOV 30 05:43	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	NOV 30 04:54 - NOV 30 05:50	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	NOV 30 04:53 - NOV 30 05:50	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	NOV 30 04:53 - NOV 30 05:50	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	NOV 30 04:46 - NOV 30 05:44	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5			+++++	NOV 30 05:40 - NOV 30 05:52	PnnRne
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++		+++++	NOV 30 04:45 - NOV 30 05:49	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	NOV 30 04:47 - NOV 30 05:52	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 : 2032-11-30T05:16:24.220  
 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 : 3424861450735391616  
 2Mass ID (if available) : 06000605+2338550  
 ICRS Star Coord at Epoch: 06h 00m 06.05589s +23:38:55.07328s  
 RUWE (>1.4 is poor) : 1.63  
 K magnitude : 13.715  
 G magnitude : 16.171  
 RP magnitude : 15.359  
 BP magnitude : 16.801  
 DUPflag : 0  
 Distance (au) : 18.105  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.27  
 Sun-Target sep (deg) : 158.07  
 Sun-Moon sep (deg) : 127.11  
 B (ring opening deg) : 75.33  
 PA of pole (deg) : 57.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.737  
 C/A sky separation (km) : 35936.1  
 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

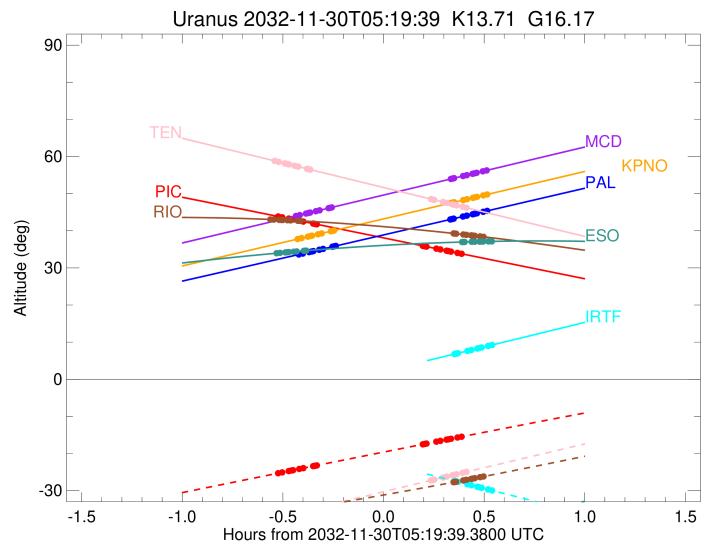
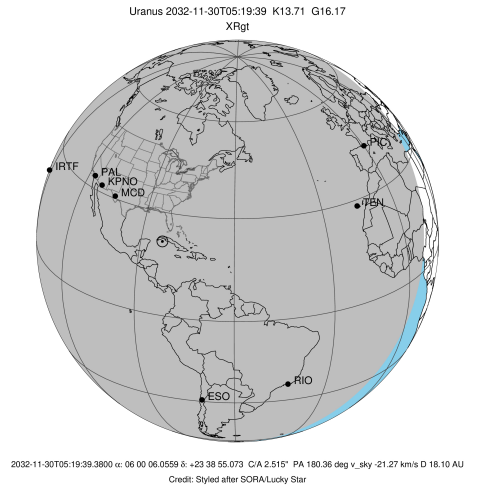


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-30T04:47:51.390		43.93	-25.38	51518.18	-15.66		
lambda	I	2032-11-30T04:49:28.392		43.63	-25.08	50026.71	-15.13		
delta	I	2032-11-30T04:51:24.823		43.28	-24.73	48300.35	-14.51		
gamma	I	2032-11-30T04:52:11.643		43.13	-24.59	47627.36	-14.24		
eta	I	2032-11-30T04:52:43.551		43.04	-24.49	47176.12	-14.05		
beta	I	2032-11-30T04:54:33.609		42.70	-24.16	45668.25	-13.33		
alpha	I	2032-11-30T04:55:44.774		42.48	-23.94	44736.30	-12.84		
4	I	2032-11-30T04:58:45.771		41.93	-23.39	42533.14	-11.45		
5	I	2032-11-30T04:59:07.349		41.86	-23.33	42287.73	-11.25		
6	I	2032-11-30T04:59:46.156		41.75	-23.21	41856.78	-10.96		

No planet occultations

6	E	2032-11-30T05:31:25.741		35.92	-17.52	41879.69	10.94		
5	E	2032-11-30T05:31:55.446		35.83	-17.43	42207.00	11.23		
4	E	2032-11-30T05:32:22.885		35.75	-17.35	42531.97	11.43		
alpha	E	2032-11-30T05:35:21.736		35.20	-16.82	44696.83	12.81		
beta	E	2032-11-30T05:36:34.392		34.98	-16.60	45644.91	13.31		
eta	E	2032-11-30T05:38:26.427		34.63	-16.27	47176.12	14.01		
gamma	E	2032-11-30T05:38:57.988		34.54	-16.18	47621.32	14.20		
delta	E	2032-11-30T05:39:45.354		34.39	-16.04	48300.35	14.47		
lambda	E	2032-11-30T05:41:42.101		34.03	-15.69	50026.71	15.09		
epsilon	E	2032-11-30T05:43:06.254		33.78	-15.44	51314.26	15.61		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-11-30T05:23:20.190  
 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 : 3424861450735391616  
 2Mass ID (if available) : 06000605+2338550  
 ICRS Star Coord at Epoch: 06h 00m 06.05589s +23:38:55.07328s  
 RUWE (>1.4 is poor) : 1.63  
 K magnitude : 13.715  
 G magnitude : 16.171  
 RP magnitude : 15.359  
 BP magnitude : 16.801  
 DUPflag : 0  
 Distance (au) : 18.105  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.27  
 Sun-Target sep (deg) : 158.07  
 Sun-Moon sep (deg) : 126.38  
 B (ring opening deg) : 75.33  
 PA of pole (deg) : 57.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.658  
 C/A sky separation (km) : 34903.4  
 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

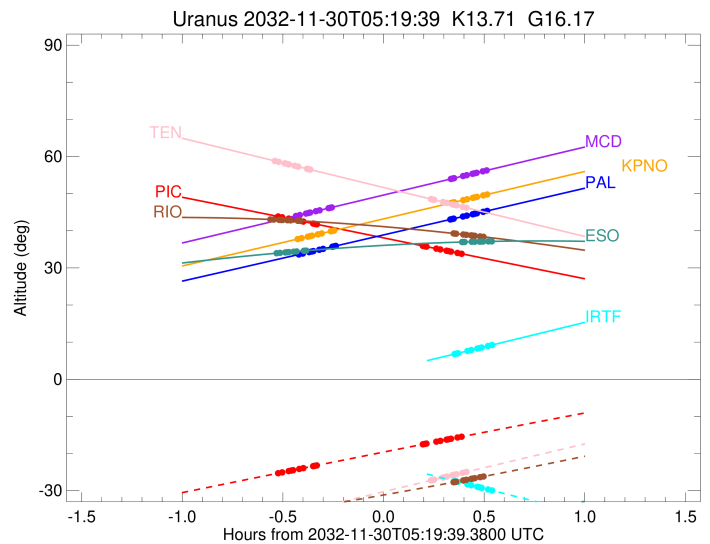
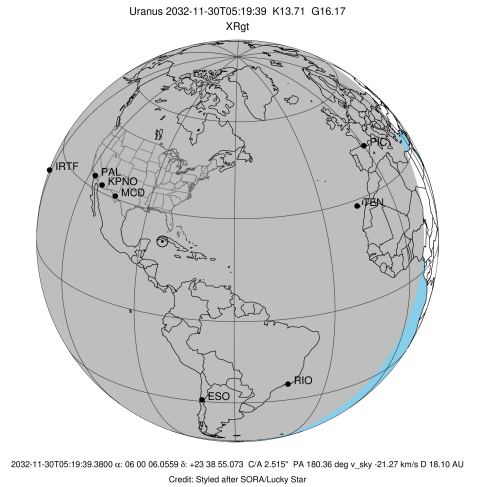


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-30T04:54:02.474		33.54	-52.52	51515.32	-16.05		
lambda	I	2032-11-30T04:55:36.779		33.87	-52.84	50026.71	-15.57		
delta	I	2032-11-30T04:57:29.705		34.26	-53.23	48300.35	-15.00		
gamma	I	2032-11-30T04:58:14.935		34.42	-53.39	47627.47	-14.75		
eta	I	2032-11-30T04:58:45.707		34.52	-53.50	47176.12	-14.58		
beta	I	2032-11-30T05:00:31.336		34.89	-53.86	45668.72	-13.94		
alpha	I	2032-11-30T05:01:39.210		35.12	-54.10	44737.08	-13.50		
4	I	2032-11-30T05:04:29.865		35.72	-54.68	42533.99	-12.26		
5	I	2032-11-30T05:04:49.892		35.79	-54.75	42289.80	-12.10		
6	I	2032-11-30T05:05:26.168		35.91	-54.88	41855.39	-11.84		

No planet occultations

6	E	2032-11-30T05:39:37.551		43.06	-61.85	41879.74	11.87		
5	E	2032-11-30T05:40:04.599		43.16	-61.94	42202.77	12.13		
4	E	2032-11-30T05:40:30.471		43.25	-62.03	42533.29	12.30		
alpha	E	2032-11-30T05:43:18.088		43.83	-62.59	44695.56	13.54		
beta	E	2032-11-30T05:44:27.089		44.07	-62.82	45644.37	13.99		
eta	E	2032-11-30T05:46:14.067		44.45	-63.17	47176.12	14.63		
gamma	E	2032-11-30T05:46:44.310		44.55	-63.27	47621.24	14.80		
delta	E	2032-11-30T05:47:29.798		44.71	-63.42	48300.35	15.05		
lambda	E	2032-11-30T05:49:22.294		45.10	-63.79	50026.71	15.63		
epsilon	E	2032-11-30T05:50:42.768		45.39	-64.06	51299.67	16.12		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-11-30T05:23:09.220  
 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 : 3424861450735391616  
 2Mass ID (if available) : 06000605+2338550  
 ICRS Star Coord at Epoch: 06h 00m 06.05589s +23:38:55.07328s  
 RUWE (>1.4 is poor) : 1.63  
 K magnitude : 13.715  
 G magnitude : 16.171  
 RP magnitude : 15.359  
 BP magnitude : 16.801  
 DUPflag : 0  
 Distance (au) : 18.105  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.27  
 Sun-Target sep (deg) : 158.07  
 Sun-Moon sep (deg) : 126.44  
 B (ring opening deg) : 75.33  
 PA of pole (deg) : 57.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.636  
 C/A sky separation (km) : 34607.5  
 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  
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 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

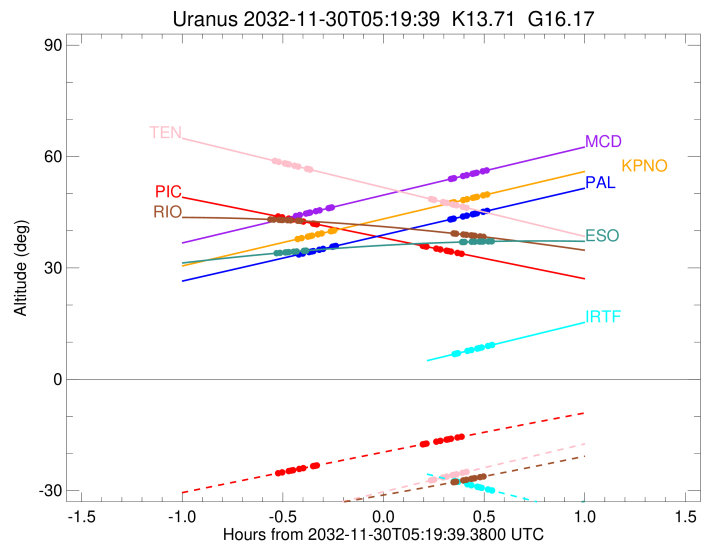
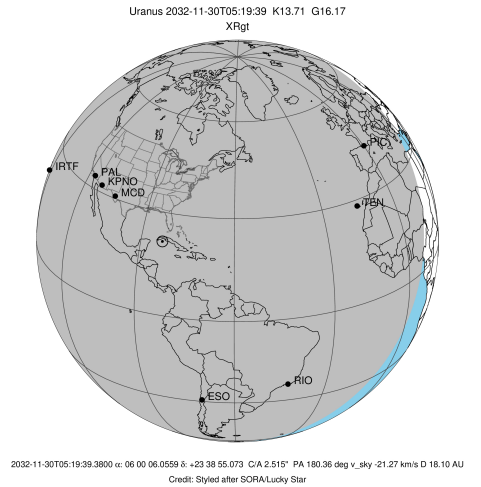


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-30T04:53:42.148		37.69	-57.04	51513.86	-16.19		
lambda	I	2032-11-30T04:55:15.476		38.02	-57.37	50026.71	-15.72		
delta	I	2032-11-30T04:57:07.222		38.42	-57.76	48300.35	-15.17		
gamma	I	2032-11-30T04:57:51.933		38.58	-57.91	47627.52	-14.93		
eta	I	2032-11-30T04:58:22.342		38.68	-58.02	47176.12	-14.76		
beta	I	2032-11-30T05:00:06.589		39.05	-58.38	45668.91	-14.14		
alpha	I	2032-11-30T05:01:13.476		39.29	-58.61	44737.39	-13.71		
4	I	2032-11-30T05:04:01.182		39.88	-59.20	42534.32	-12.51		
5	I	2032-11-30T05:04:20.780		39.95	-59.27	42290.55	-12.35		
6	I	2032-11-30T05:04:56.391		40.08	-59.39	41854.88	-12.10		

No planet occultations

6	E	2032-11-30T05:39:46.397		47.48	-66.53	41879.74	12.13		
5	E	2032-11-30T05:40:12.796		47.58	-66.62	42201.86	12.38		
4	E	2032-11-30T05:40:38.242		47.67	-66.70	42533.60	12.54		
alpha	E	2032-11-30T05:43:22.936		48.25	-67.25	44695.30	13.75		
beta	E	2032-11-30T05:44:30.956		48.49	-67.48	45644.26	14.18		
eta	E	2032-11-30T05:46:16.567		48.87	-67.83	47176.12	14.81		
gamma	E	2032-11-30T05:46:46.453		48.98	-67.92	47621.23	14.98		
delta	E	2032-11-30T05:47:31.430		49.14	-68.07	48300.35	15.22		
lambda	E	2032-11-30T05:49:22.767		49.53	-68.44	50026.71	15.78		
epsilon	E	2032-11-30T05:50:42.314		49.81	-68.70	51296.79	16.26		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-11-30T05:22:48.150  
 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 : 3424861450735391616  
 2Mass ID (if available) : 06000605+2338550  
 ICRS Star Coord at Epoch: 06h 00m 06.05589s +23:38:55.07328s  
 RUWE (>1.4 is poor) : 1.63  
 K magnitude : 13.715  
 G magnitude : 16.171  
 RP magnitude : 15.359  
 BP magnitude : 16.801  
 DUPflag : 0  
 Distance (au) : 18.105  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.27  
 Sun-Target sep (deg) : 158.07  
 Sun-Moon sep (deg) : 126.53  
 B (ring opening deg) : 75.33  
 PA of pole (deg) : 57.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.610  
 C/A sky separation (km) : 34267.2  
 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

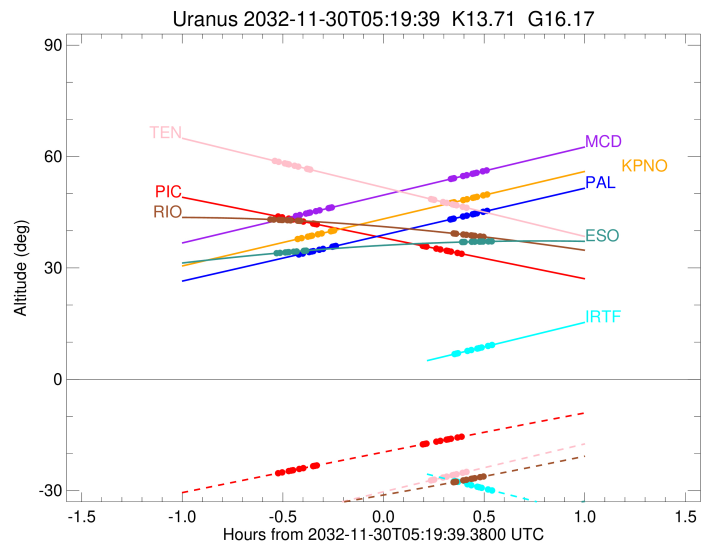
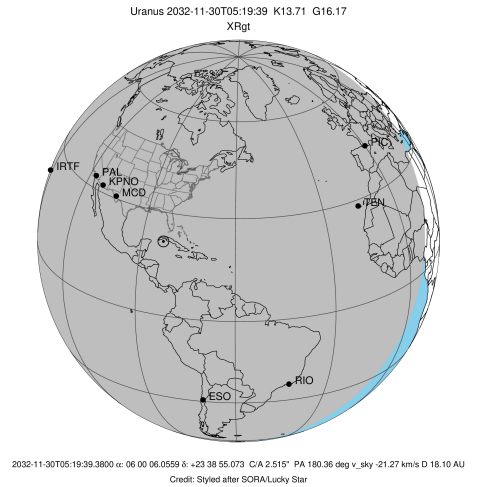


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-30T04:53:11.083		43.91	-63.54	51512.12	-16.36		
lambda	I	2032-11-30T04:54:43.290		44.24	-63.86	50026.71	-15.90		
delta	I	2032-11-30T04:56:33.691		44.64	-64.25	48300.35	-15.36		
gamma	I	2032-11-30T04:57:17.815		44.80	-64.40	47627.58	-15.13		
eta	I	2032-11-30T04:57:47.814		44.91	-64.51	47176.12	-14.97		
beta	I	2032-11-30T04:59:30.508		45.27	-64.87	45669.14	-14.36		
alpha	I	2032-11-30T05:00:36.292		45.51	-65.09	44737.75	-13.95		
4	I	2032-11-30T05:03:20.746		46.10	-65.67	42534.71	-12.79		
5	I	2032-11-30T05:03:39.879		46.17	-65.73	42291.41	-12.63		
6	I	2032-11-30T05:04:14.765		46.30	-65.85	41854.28	-12.40		

No planet occultations

6	E	2032-11-30T05:39:47.149		53.97	-73.00	41879.72	12.43		
5	E	2032-11-30T05:40:12.850		54.06	-73.08	42200.86	12.66		
4	E	2032-11-30T05:40:37.832		54.15	-73.16	42533.94	12.82		
alpha	E	2032-11-30T05:43:19.320		54.73	-73.67	44695.02	13.98		
beta	E	2032-11-30T05:44:26.254		54.97	-73.88	45644.14	14.40		
eta	E	2032-11-30T05:46:10.342		55.35	-74.21	47176.12	15.01		
gamma	E	2032-11-30T05:46:39.828		55.45	-74.30	47621.21	15.18		
delta	E	2032-11-30T05:47:24.231		55.61	-74.44	48300.35	15.41		
lambda	E	2032-11-30T05:49:14.263		56.01	-74.77	50026.71	15.96		
epsilon	E	2032-11-30T05:50:32.768		56.29	-75.01	51293.58	16.42		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-11-30T05:16:35.500  
 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 : 3424861450735391616  
 2Mass ID (if available) : 06000605+2338550  
 ICRS Star Coord at Epoch: 06h 00m 06.05589s +23:38:55.07328s  
 RUWE (>1.4 is poor) : 1.63  
 K magnitude : 13.715  
 G magnitude : 16.171  
 RP magnitude : 15.359  
 BP magnitude : 16.801  
 DUPflag : 0  
 Distance (au) : 18.105  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.27  
 Sun-Target sep (deg) : 158.07  
 Sun-Moon sep (deg) : 127.21  
 B (ring opening deg) : 75.33  
 PA of pole (deg) : 57.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.592  
 C/A sky separation (km) : 34028.8  
 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

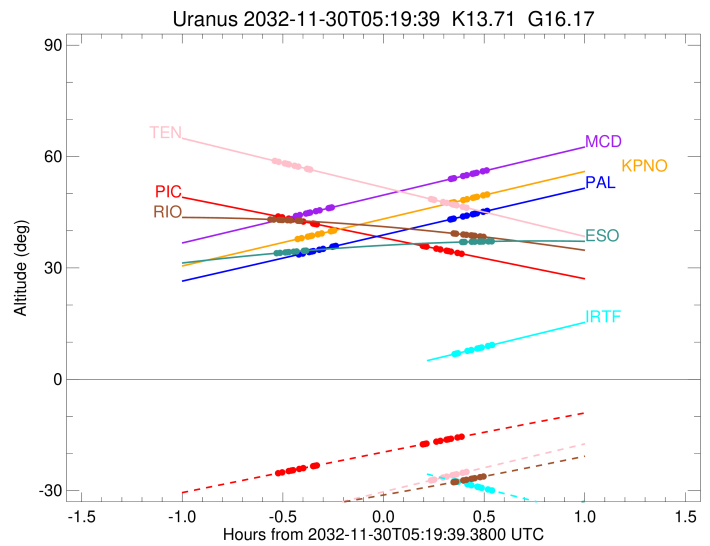
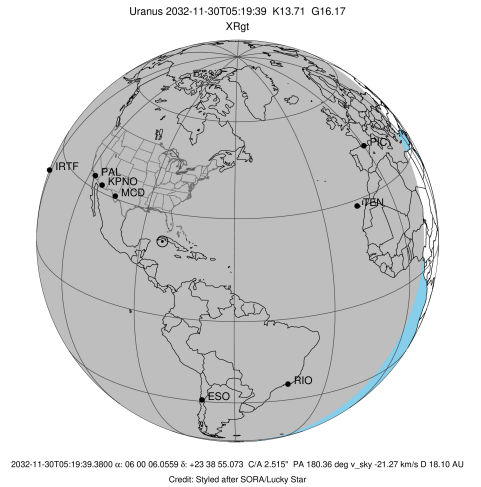


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-30T04:46:54.032		58.90	-37.44	51509.04	-16.53		
lambda	I	2032-11-30T04:48:25.086		58.56	-37.11	50026.71	-16.07		
delta	I	2032-11-30T04:50:14.260		58.16	-36.71	48300.35	-15.54		
gamma	I	2032-11-30T04:50:57.862		58.00	-36.56	47627.67	-15.31		
eta	I	2032-11-30T04:51:27.506		57.89	-36.45	47176.12	-15.15		
beta	I	2032-11-30T04:53:08.874		57.52	-36.08	45669.48	-14.56		
alpha	I	2032-11-30T04:54:13.749		57.28	-35.84	44738.27	-14.15		
4	I	2032-11-30T04:56:55.647		56.68	-35.25	42535.25	-13.01		
5	I	2032-11-30T04:57:14.409		56.61	-35.19	42292.55	-12.86		
6	I	2032-11-30T04:57:48.807		56.49	-35.06	41853.48	-12.63		

No planet occultations

6	E	2032-11-30T05:33:51.751		48.53	-27.23	41879.72	12.61		
5	E	2032-11-30T05:34:17.090		48.43	-27.14	42200.84	12.84		
4	E	2032-11-30T05:34:41.743		48.34	-27.05	42533.94	12.99		
alpha	E	2032-11-30T05:37:21.451		47.76	-26.47	44695.05	14.12		
beta	E	2032-11-30T05:38:27.795		47.51	-26.24	45644.16	14.52		
eta	E	2032-11-30T05:40:11.107		47.13	-25.86	47176.12	15.11		
gamma	E	2032-11-30T05:40:40.401		47.03	-25.76	47621.21	15.27		
delta	E	2032-11-30T05:41:24.535		46.87	-25.60	48300.35	15.50		
lambda	E	2032-11-30T05:43:13.995		46.46	-25.21	50026.71	16.03		
epsilon	E	2032-11-30T05:44:32.247		46.18	-24.93	51294.87	16.49		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-11-30T05:24:35.130  
 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 : 3424861450735391616  
 2Mass ID (if available) : 06000605+2338550  
 ICRS Star Coord at Epoch: 06h 00m 06.05589s +23:38:55.07328s  
 RUWE (>1.4 is poor) : 1.63  
 K magnitude : 13.715  
 G magnitude : 16.171  
 RP magnitude : 15.359  
 BP magnitude : 16.801  
 DUPflag : 0  
 Distance (au) : 18.105  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.27  
 Sun-Target sep (deg) : 158.07  
 Sun-Moon sep (deg) : 125.82  
 B (ring opening deg) : 75.33  
 PA of pole (deg) : 57.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.669  
 C/A sky separation (km) : 35050.9  
 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

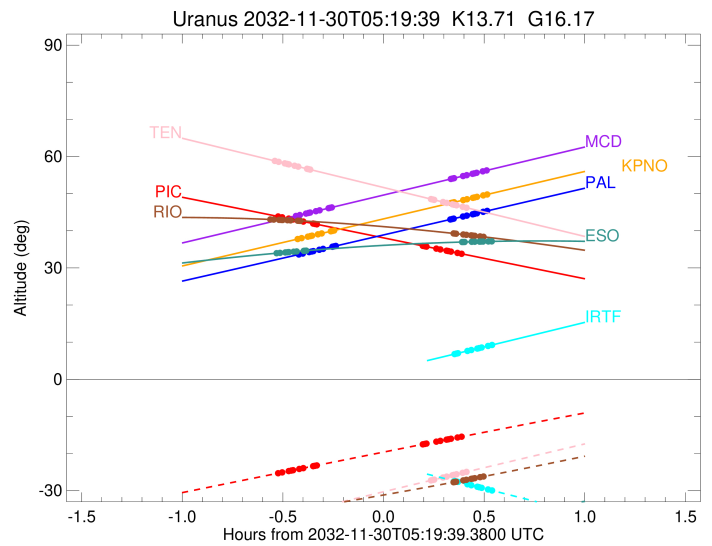
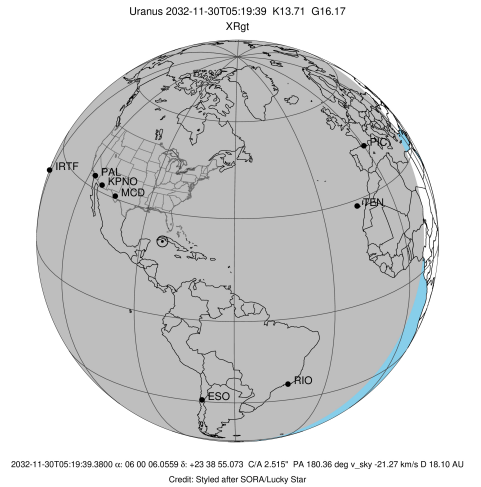


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-30T04:55:01.647	-3.04x	-17.06	51516.36	-15.79			
lambda	I	2032-11-30T04:56:37.610	-2.71x	-17.42	50026.71	-15.30			
delta	I	2032-11-30T04:58:32.501	-2.30x	-17.85	48300.35	-14.74			
gamma	I	2032-11-30T04:59:18.542	-2.14x	-18.02	47627.44	-14.49			
eta	I	2032-11-30T04:59:49.871	-2.03x	-18.14	47176.12	-14.32			
beta	I	2032-11-30T05:01:37.485	-1.65x	-18.54	45668.58	-13.68			
alpha	I	2032-11-30T05:02:46.688	-1.40x	-18.80	44736.86	-13.24			
4	I	2032-11-30T05:05:40.930	-0.78x	-19.45	42533.78	-12.00			
5	I	2032-11-30T05:06:01.428	-0.71x	-19.53	42289.29	-11.83			
6	I	2032-11-30T05:06:38.474	-0.58x	-19.67	41855.73	-11.57			

No planet occultations

6	E	2032-11-30T05:40:52.909	6.80	-27.42	41879.75	11.61			
5	E	2032-11-30T05:41:20.587	6.90	-27.53	42203.08	11.87			
4	E	2032-11-30T05:41:46.989	7.00	-27.63	42533.19	12.04			
alpha	E	2032-11-30T05:44:37.984	7.62	-28.27	44695.64	13.29			
beta	E	2032-11-30T05:45:48.257	7.87	-28.54	45644.40	13.74			
eta	E	2032-11-30T05:47:37.113	8.27	-28.95	47176.12	14.39			
gamma	E	2032-11-30T05:48:07.870	8.38	-29.07	47621.24	14.56			
delta	E	2032-11-30T05:48:54.116	8.55	-29.25	48300.35	14.81			
lambda	E	2032-11-30T05:50:48.427	8.97	-29.68	50026.71	15.39			
epsilon	E	2032-11-30T05:52:10.189	9.26	-29.99	51300.27	15.87			

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-11-30T05:18:20.470  
 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 : 3424861450735391616  
 2Mass ID (if available) : 06000605+2338550  
 ICRS Star Coord at Epoch: 06h 00m 06.05589s +23:38:55.07328s  
 RUWE (>1.4 is poor) : 1.63  
 K magnitude : 13.715  
 G magnitude : 16.171  
 RP magnitude : 15.359  
 BP magnitude : 16.801  
 DUPflag : 0  
 Distance (au) : 18.105  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.27  
 Sun-Target sep (deg) : 158.07  
 Sun-Moon sep (deg) : 126.92  
 B (ring opening deg) : 75.33  
 PA of pole (deg) : 57.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.163  
 C/A sky separation (km) : 28404.2  
 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



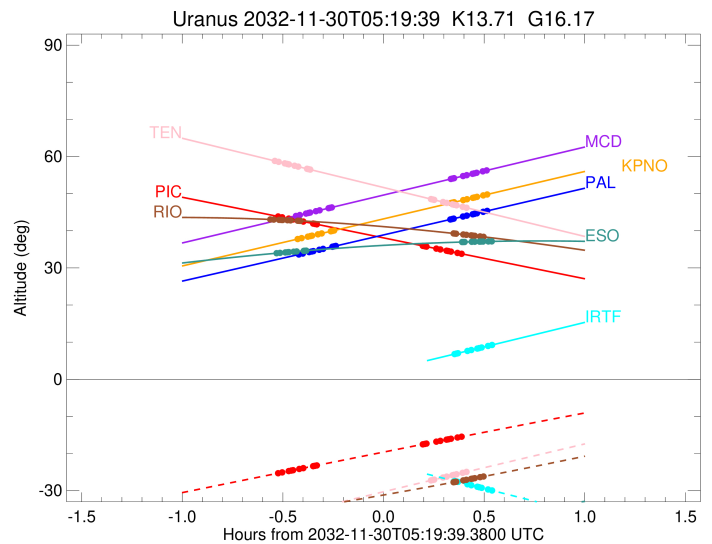
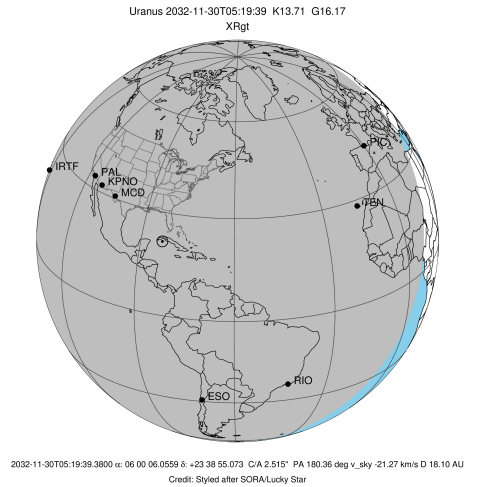
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-30T04:45:37.481		43.06	-36.24	51479.92	-18.50		
lambda	I	2032-11-30T04:46:56.804		43.01	-36.05	50026.71	-18.19		
delta	I	2032-11-30T04:48:32.533		42.95	-35.83	48300.35	-17.87		
gamma	I	2032-11-30T04:49:10.285		42.92	-35.75	47628.45	-17.73		
eta	I	2032-11-30T04:49:35.871		42.91	-35.69	47176.12	-17.63		
beta	I	2032-11-30T04:51:01.989		42.85	-35.49	45672.44	-17.27		
alpha	I	2032-11-30T04:51:56.231		42.81	-35.36	44742.82	-17.03		
4	I	2032-11-30T04:54:07.812		42.71	-35.05	42541.35	-16.38		
5	I	2032-11-30T04:54:22.453		42.69	-35.01	42302.54	-16.30		
6	I	2032-11-30T04:54:50.468		42.67	-34.94	41845.15	-16.18		

No planet occultations

6	E	2032-11-30T05:40:35.078		39.29	-27.73	41878.46	16.16		
5	E	2032-11-30T05:40:54.027		39.25	-27.67	42186.71	16.29		
4	E	2032-11-30T05:41:14.714		39.22	-27.61	42539.90	16.37		
alpha	E	2032-11-30T05:43:23.817		39.00	-27.25	44690.99	17.02		
beta	E	2032-11-30T05:44:19.427		38.91	-27.09	45642.55	17.26		
eta	E	2032-11-30T05:45:47.325		38.76	-26.83	47176.12	17.61		
gamma	E	2032-11-30T05:46:12.515		38.72	-26.76	47621.02	17.71		
delta	E	2032-11-30T05:46:50.723		38.65	-26.65	48300.35	17.85		
lambda	E	2032-11-30T05:48:26.547		38.48	-26.37	50026.71	18.18		
epsilon	E	2032-11-30T05:49:32.884		38.37	-26.18	51239.43	18.48		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-11-30T05:20:30.910  
 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 : 3424861450735391616  
 2Mass ID (if available) : 06000605+2338550  
 ICRS Star Coord at Epoch: 06h 00m 06.05589s +23:38:55.07328s  
 RUWE (>1.4 is poor) : 1.63  
 K magnitude : 13.715  
 G magnitude : 16.171  
 RP magnitude : 15.359  
 BP magnitude : 16.801  
 DUPflag : 0  
 Distance (au) : 18.105  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.27  
 Sun-Target sep (deg) : 158.07  
 Sun-Moon sep (deg) : 126.63  
 B (ring opening deg) : 75.33  
 PA of pole (deg) : 57.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.123  
 C/A sky separation (km) : 27879.4  
 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	2032-11-30T04:47:30.122		33.94	-39.04	51477.84	-18.61		
lambda	I	2032-11-30T04:48:48.823		34.04	-39.02	50026.71	-18.32		
delta	I	2032-11-30T04:50:23.854		34.17	-38.98	48300.35	-18.01		
gamma	I	2032-11-30T04:51:01.298		34.22	-38.97	47628.50	-17.87		
eta	I	2032-11-30T04:51:26.670		34.25	-38.96	47176.12	-17.78		
beta	I	2032-11-30T04:52:51.985		34.36	-38.93	45672.63	-17.45		
alpha	I	2032-11-30T04:53:45.669		34.43	-38.90	44743.09	-17.22		
4	I	2032-11-30T04:55:55.679		34.59	-38.85	42541.81	-16.60		
5	I	2032-11-30T04:56:10.116		34.61	-38.84	42303.11	-16.53		
6	I	2032-11-30T04:56:37.808		34.64	-38.83	41844.58	-16.41		

No planet occultations

6	E	2032-11-30T05:43:08.486		36.96	-36.34	41878.24	16.42		
5	E	2032-11-30T05:43:27.061		36.97	-36.31	42185.42	16.54		
4	E	2032-11-30T05:43:47.554		36.98	-36.29	42540.56	16.62		
alpha	E	2032-11-30T05:45:54.809		37.03	-36.12	44690.63	17.24		
beta	E	2032-11-30T05:46:49.750		37.05	-36.05	45642.41	17.47		
eta	E	2032-11-30T05:48:16.655		37.08	-35.93	47176.12	17.81		
gamma	E	2032-11-30T05:48:41.575		37.09	-35.89	47621.00	17.90		
delta	E	2032-11-30T05:49:19.388		37.10	-35.84	48300.35	18.03		
lambda	E	2032-11-30T05:50:54.285		37.13	-35.71	50026.71	18.35		
epsilon	E	2032-11-30T05:51:59.690		37.15	-35.61	51233.15	18.64		