

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-31T05:57:17.940
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 55692192387889280
 2Mass ID (if available) : 03154552+1746085

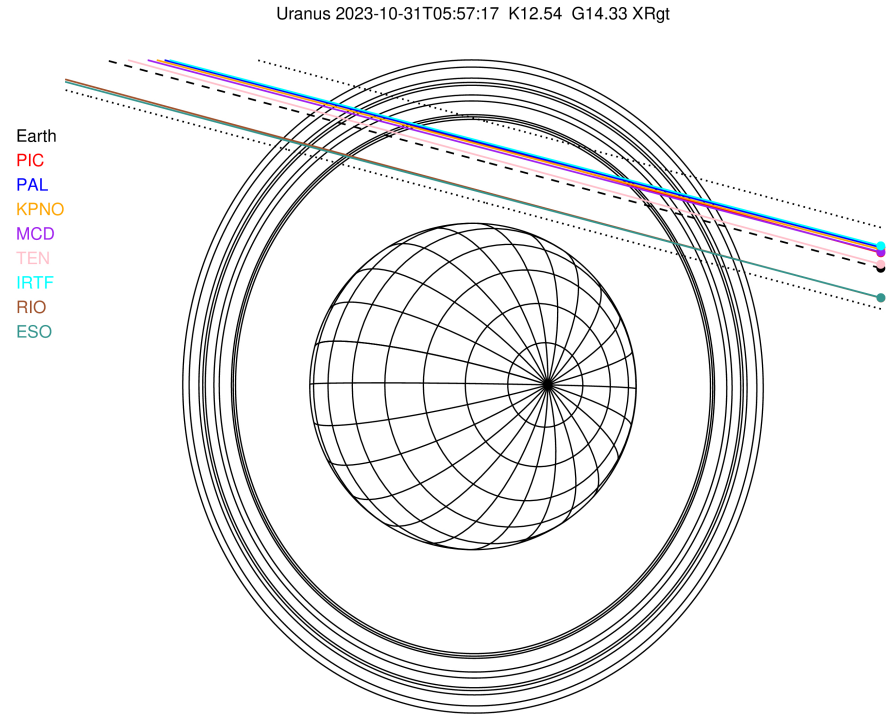
ICRS Star Coord at Epoch: 03h 15m 45.52050s +17:46:08.08736s

RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.541
 G magnitude : 14.329
 RP magnitude : 13.738
 BP magnitude : 14.758
 DUPflag : 0
 Distance (au) : 18.659
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.53
 Sun-Target sep (deg) : 165.94
 Sun-Moon sep (deg) : 17.20
 B (ring opening deg) : 62.70
 PA of pole (deg) : -88.77

#	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

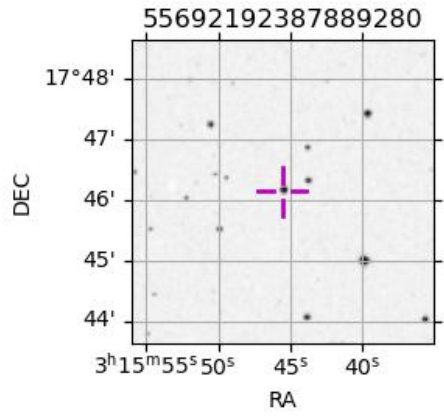


2023-10-31T05:57:17.9400 ex: 03 15 45.5205 s; +17 46 08.087 C/A 2.548" PA 164.97 deg v_sky -22.53 km/s D 18.66 AU
 Credit: Styled after SORA/Lucky Star

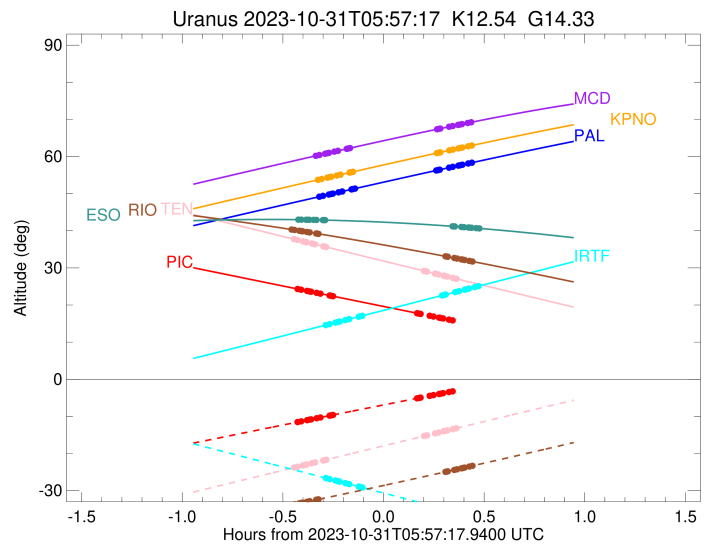
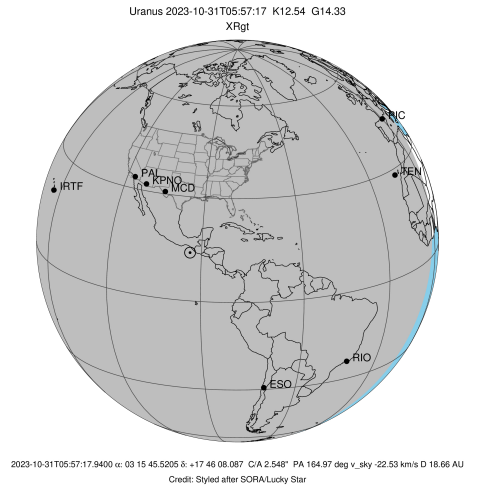


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	++	+++++	OCT 31 05:32 - OCT 31 06:07	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++++	+++++	+++++	OCT 31 05:38 - OCT 31 06:23	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+++++	+++++	OCT 31 05:38 - OCT 31 06:23	PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+++++	+++++	OCT 31 05:38 - OCT 31 06:23	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+++++	+++++	OCT 31 05:37 - OCT 31 06:23	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+++++	+++++	OCT 31 05:30 - OCT 31 06:19	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+++++	+++++	OCT 31 05:40 - OCT 31 06:25	PnnRie
KAV	Kavalur Observatory	12.6	78.8	+++++	+++++	+++++	OCT 31 05:40 - OCT 31 06:25	PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+++++	+++++	OCT 31 05:30 - OCT 31 06:23	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++	+++++	+++++	OCT 31 05:32 - OCT 31 06:25	PnnRie
AAT	Siding Spring (AAT)	-31.3	149.1	+++++	+++++	+++++	OCT 31 05:32 - OCT 31 06:25	PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++	+++++	+++++	OCT 31 05:32 - OCT 31 06:25	PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+++++	+++++	OCT 31 05:32 - OCT 31 06:25	PnnRnn



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-31T05:53:11.650
 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 : 55692192387889280
 2Mass ID (if available) : 03154552+1746085
 ICRS Star Coord at Epoch: 03h 15m 45.52050s +17:46:08.08736s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.541
 G magnitude : 14.329
 RP magnitude : 13.738
 BP magnitude : 14.758
 DUPflag : 0
 Distance (au) : 18.659
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.53
 Sun-Target sep (deg) : 165.94
 Sun-Moon sep (deg) : 16.45
 B (ring opening deg) : 62.70
 PA of pole (deg) : -88.77
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.732
 C/A sky separation (km) : 36969.1
 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

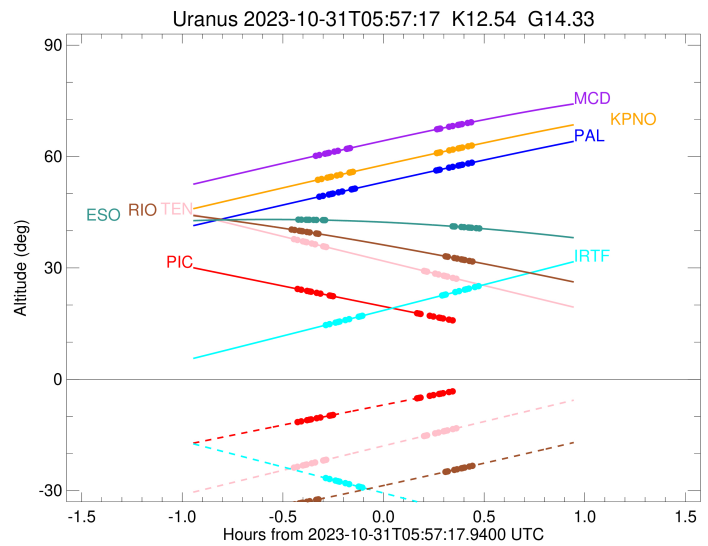
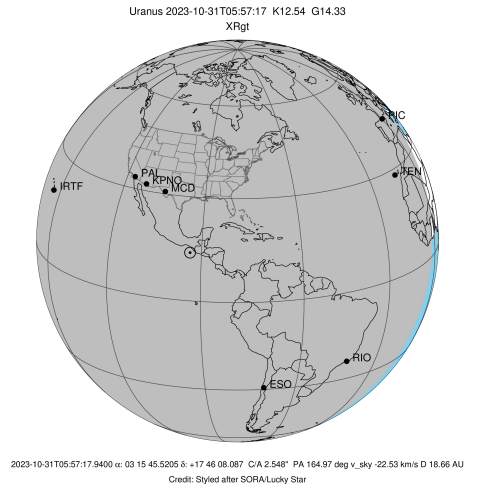


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-31T05:32:05.146		24.25	-11.46	50743.67	-17.14		
lambda	I	2023-10-31T05:32:47.348		24.12	-11.33	50026.71	-16.84		
delta	I	2023-10-31T05:34:32.267		23.80	-11.02	48300.35	-16.05		
gamma	I	2023-10-31T05:35:14.926		23.67	-10.89	47622.80	-15.71		
eta	I	2023-10-31T05:35:43.578		23.58	-10.80	47176.12	-15.47		
beta	I	2023-10-31T05:37:23.099		23.27	-10.50	45678.41	-14.59		
alpha	I	2023-10-31T05:38:31.080		23.06	-10.29	44706.25	-13.91		
4	I	2023-10-31T05:41:17.605		22.55	-9.79	42542.05	-12.12		
5	I	2023-10-31T05:41:42.350		22.48	-9.72	42242.94	-11.89		
6	I	2023-10-31T05:42:18.399		22.37	-9.61	41826.64	-11.39		

No planet occultations

6	E	2023-10-31T06:07:14.149		17.81	-5.14	41797.83	11.38		
5	E	2023-10-31T06:07:57.756		17.67	-5.01	42305.71	11.87		
4	E	2023-10-31T06:08:15.986		17.62	-4.96x	42526.31	12.10		
alpha	E	2023-10-31T06:11:01.429		17.12	-4.47x	44684.63	13.89		
beta	E	2023-10-31T06:12:11.253		16.90	-4.27x	45676.59	14.56		
eta	E	2023-10-31T06:13:51.241		16.60	-3.97x	47176.12	15.44		
gamma	E	2023-10-31T06:14:19.878		16.51	-3.89x	47621.56	15.67		
delta	E	2023-10-31T06:15:02.714		16.38	-3.76x	48300.35	16.02		
lambda	E	2023-10-31T06:16:47.890		16.07	-3.45x	50026.71	16.80		
epsilon	E	2023-10-31T06:17:52.576		15.87	-3.26x	51127.74	17.09		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-31T05:59:23.450
 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 : 55692192387889280
 2Mass ID (if available) : 03154552+1746085
 ICRS Star Coord at Epoch: 03h 15m 45.52050s +17:46:08.08736s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.541
 G magnitude : 14.329
 RP magnitude : 13.738
 BP magnitude : 14.758
 DUPflag : 0
 Distance (au) : 18.659
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.53
 Sun-Target sep (deg) : 165.94
 Sun-Moon sep (deg) : 17.72
 B (ring opening deg) : 62.70
 PA of pole (deg) : -88.77
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.751
 C/A sky separation (km) : 37223.5
 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

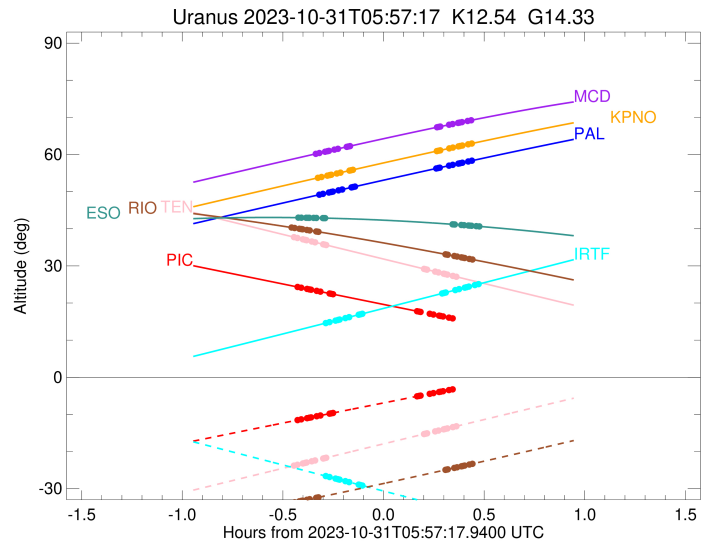
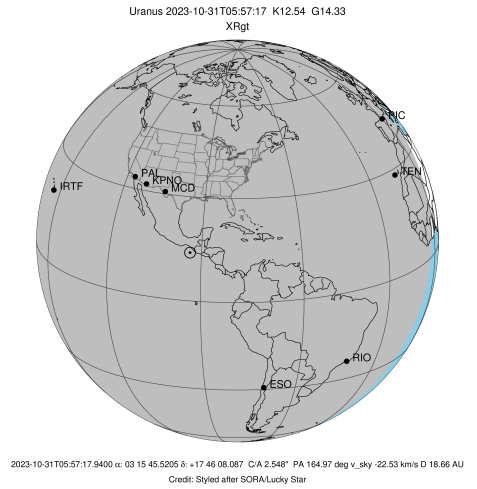


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-31T05:38:34.212		49.26	-58.07	50743.90	-17.12		
lambda	I	2023-10-31T05:39:16.480		49.41	-58.20	50026.71	-16.82		
delta	I	2023-10-31T05:41:01.615		49.77	-58.52	48300.35	-16.01		
gamma	I	2023-10-31T05:41:44.409		49.92	-58.64	47622.73	-15.65		
eta	I	2023-10-31T05:42:13.158		50.01	-58.73	47176.12	-15.41		
beta	I	2023-10-31T05:43:53.140		50.36	-59.03	45678.59	-14.50		
alpha	I	2023-10-31T05:45:01.629		50.59	-59.23	44705.66	-13.81		
4	I	2023-10-31T05:47:49.914		51.16	-59.72	42541.35	-11.95		
5	I	2023-10-31T05:48:14.842		51.25	-59.80	42244.60	-11.71		
6	I	2023-10-31T05:48:51.704		51.37	-59.90	41825.76	-11.19		

No planet occultations

6	E	2023-10-31T06:12:57.048		56.23	-63.89	41797.89	11.21		
5	E	2023-10-31T06:13:41.236		56.38	-64.00	42305.60	11.73		
4	E	2023-10-31T06:13:59.689		56.44	-64.05	42526.30	11.97		
alpha	E	2023-10-31T06:16:46.335		56.99	-64.47	44684.64	13.83		
beta	E	2023-10-31T06:17:56.364		57.22	-64.64	45676.59	14.53		
eta	E	2023-10-31T06:19:36.424		57.55	-64.89	47176.12	15.44		
gamma	E	2023-10-31T06:20:05.042		57.64	-64.96	47621.56	15.69		
delta	E	2023-10-31T06:20:47.820		57.78	-65.07	48300.35	16.04		
lambda	E	2023-10-31T06:22:32.723		58.13	-65.32	50026.71	16.86		
epsilon	E	2023-10-31T06:23:37.220		58.34	-65.47	51128.76	17.17		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-31T05:59:10.610
 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 : 55692192387889280
 2Mass ID (if available) : 03154552+1746085
 ICRS Star Coord at Epoch: 03h 15m 45.52050s +17:46:08.08736s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.541
 G magnitude : 14.329
 RP magnitude : 13.738
 BP magnitude : 14.758
 DUPflag : 0
 Distance (au) : 18.659
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.53
 Sun-Target sep (deg) : 165.94
 Sun-Moon sep (deg) : 17.70
 B (ring opening deg) : 62.70
 PA of pole (deg) : -88.77
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.728
 C/A sky separation (km) : 36910.1
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

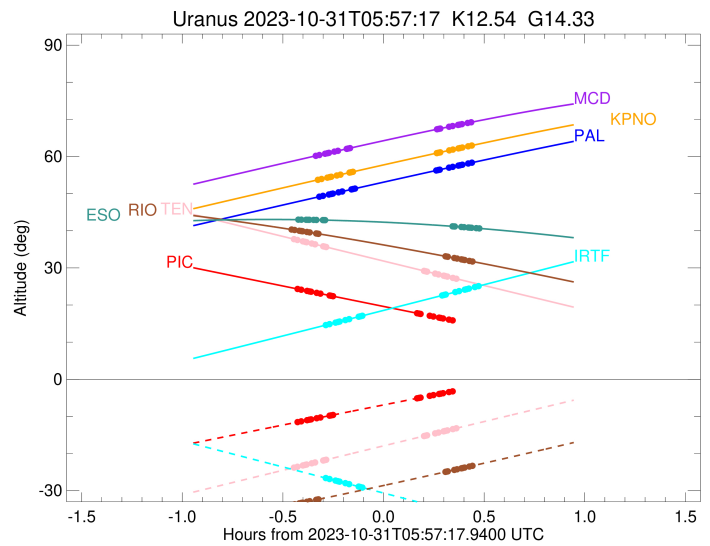
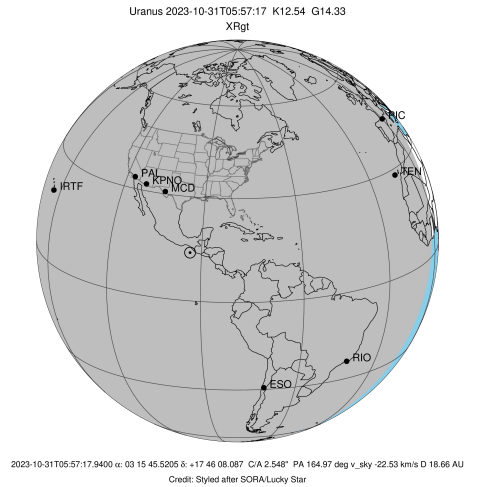


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-31T05:38:08.662		53.81	-62.49	50743.75	-17.32		
lambda	I	2023-10-31T05:38:50.434		53.96	-62.61	50026.71	-17.02		
delta	I	2023-10-31T05:40:34.226		54.31	-62.91	48300.35	-16.23		
gamma	I	2023-10-31T05:41:16.408		54.46	-63.03	47622.77	-15.89		
eta	I	2023-10-31T05:41:44.729		54.56	-63.11	47176.12	-15.65		
beta	I	2023-10-31T05:43:23.047		54.89	-63.39	45678.47	-14.77		
alpha	I	2023-10-31T05:44:30.171		55.13	-63.58	44706.07	-14.10		
4	I	2023-10-31T05:47:14.301		55.69	-64.04	42541.88	-12.32		
5	I	2023-10-31T05:47:38.609		55.77	-64.11	42243.32	-12.08		
6	I	2023-10-31T05:48:14.106		55.89	-64.20	41826.45	-11.59		

No planet occultations

6	E	2023-10-31T06:13:07.251		60.91	-67.98	41797.62	11.61		
5	E	2023-10-31T06:13:50.072		61.05	-68.08	42306.20	12.10		
4	E	2023-10-31T06:14:07.916		61.11	-68.12	42526.39	12.33		
alpha	E	2023-10-31T06:16:50.440		61.65	-68.47	44684.62	14.12		
beta	E	2023-10-31T06:17:59.111		61.87	-68.62	45676.43	14.80		
eta	E	2023-10-31T06:19:37.524		62.19	-68.83	47176.12	15.68		
gamma	E	2023-10-31T06:20:05.718		62.28	-68.89	47621.59	15.92		
delta	E	2023-10-31T06:20:47.893		62.42	-68.97	48300.35	16.27		
lambda	E	2023-10-31T06:22:31.474		62.75	-69.18	50026.71	17.05		
epsilon	E	2023-10-31T06:23:35.460		62.96	-69.31	51132.42	17.35		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-31T05:58:47.400
 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 : 55692192387889280
 2Mass ID (if available) : 03154552+1746085
 ICRS Star Coord at Epoch: 03h 15m 45.52050s +17:46:08.08736s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.541
 G magnitude : 14.329
 RP magnitude : 13.738
 BP magnitude : 14.758
 DUPflag : 0
 Distance (au) : 18.659
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.53
 Sun-Target sep (deg) : 165.94
 Sun-Moon sep (deg) : 17.65
 B (ring opening deg) : 62.70
 PA of pole (deg) : -88.77
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.699
 C/A sky separation (km) : 36526.1
 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

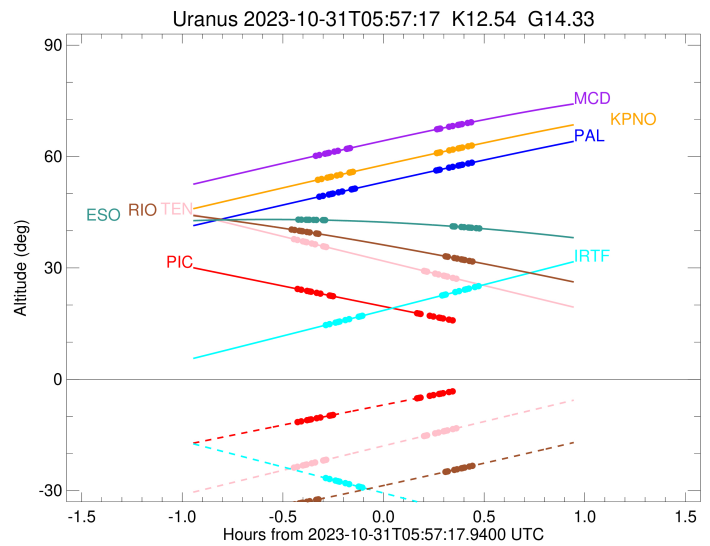
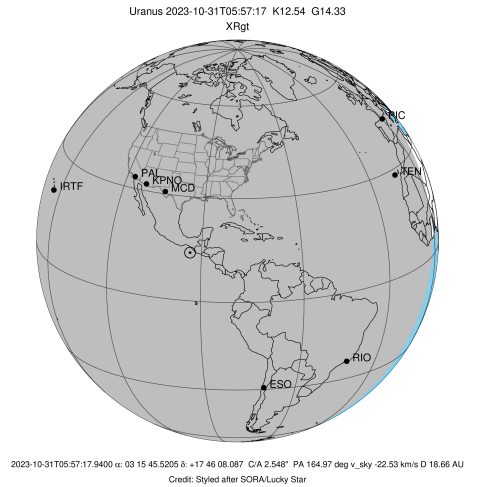


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-31T05:37:30.291		60.27	-68.17	50743.62	-17.55		
lambda	I	2023-10-31T05:38:11.483		60.41	-68.28	50026.71	-17.26		
delta	I	2023-10-31T05:39:53.703		60.76	-68.53	48300.35	-16.50		
gamma	I	2023-10-31T05:40:35.173		60.90	-68.63	47622.82	-16.17		
eta	I	2023-10-31T05:41:02.995		60.99	-68.70	47176.12	-15.94		
beta	I	2023-10-31T05:42:39.393		61.32	-68.93	45678.32	-15.09		
alpha	I	2023-10-31T05:43:44.954		61.54	-69.09	44706.57	-14.44		
4	I	2023-10-31T05:46:24.412		62.08	-69.46	42542.53	-12.74		
5	I	2023-10-31T05:46:48.038		62.16	-69.51	42241.80	-12.52		
6	I	2023-10-31T05:47:22.034		62.28	-69.59	41827.28	-12.06		

No planet occultations

6	E	2023-10-31T06:13:10.929		67.33	-72.43	41797.33	12.07		
5	E	2023-10-31T06:13:52.253		67.46	-72.49	42306.88	12.54		
4	E	2023-10-31T06:14:09.427		67.52	-72.51	42526.51	12.76		
alpha	E	2023-10-31T06:16:47.332		68.01	-72.71	44684.61	14.47		
beta	E	2023-10-31T06:17:54.454		68.22	-72.78	45676.25	15.12		
eta	E	2023-10-31T06:19:30.972		68.51	-72.89	47176.12	15.97		
gamma	E	2023-10-31T06:19:58.676		68.60	-72.92	47621.62	16.20		
delta	E	2023-10-31T06:20:40.152		68.73	-72.96	48300.35	16.53		
lambda	E	2023-10-31T06:22:22.196		69.04	-73.05	50026.71	17.29		
epsilon	E	2023-10-31T06:23:25.585		69.23	-73.11	51136.80	17.58		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-31T05:53:18.010
 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 : 55692192387889280
 2Mass ID (if available) : 03154552+1746085
 ICRS Star Coord at Epoch: 03h 15m 45.52050s +17:46:08.08736s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.541
 G magnitude : 14.329
 RP magnitude : 13.738
 BP magnitude : 14.758
 DUPflag : 0
 Distance (au) : 18.659
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.53
 Sun-Target sep (deg) : 165.94
 Sun-Moon sep (deg) : 16.57
 B (ring opening deg) : 62.70
 PA of pole (deg) : -88.77
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.598
 C/A sky separation (km) : 35151.9
 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

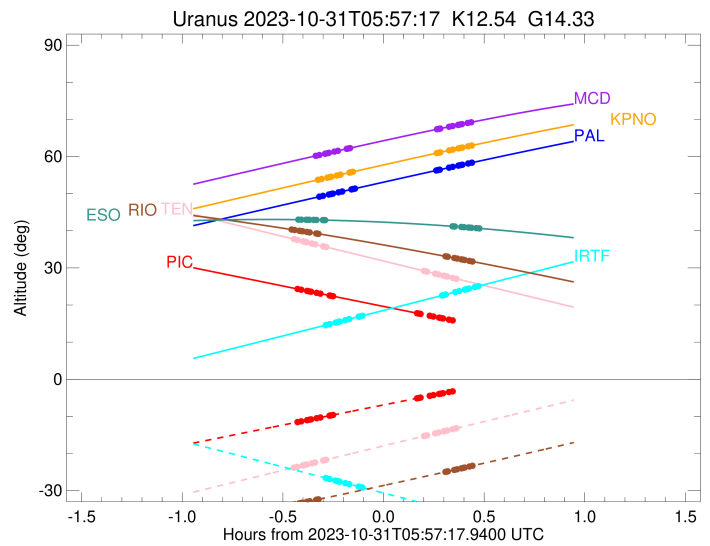
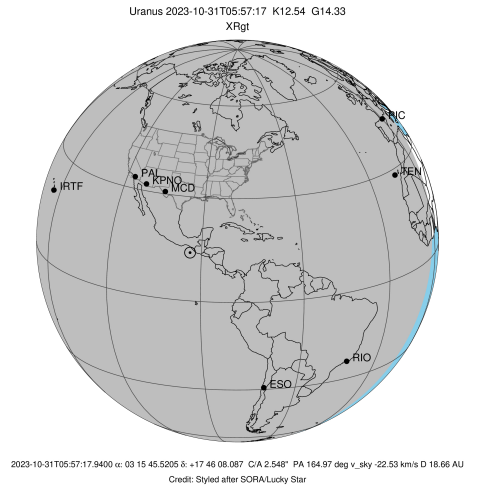


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-31T05:30:59.408		37.66	-23.71	50743.61	-18.17		
lambda	I	2023-10-31T05:31:39.121		37.52	-23.57	50026.71	-17.92		
delta	I	2023-10-31T05:33:17.243		37.15	-23.21	48300.35	-17.25		
gamma	I	2023-10-31T05:33:56.837		37.01	-23.06	47623.04	-16.96		
eta	I	2023-10-31T05:34:23.348		36.91	-22.97	47176.12	-16.76		
beta	I	2023-10-31T05:35:54.672		36.57	-22.63	45677.71	-16.02		
alpha	I	2023-10-31T05:36:56.050		36.35	-22.41	44708.48	-15.45		
4	I	2023-10-31T05:39:23.236		35.81	-21.87	42545.00	-14.01		
5	I	2023-10-31T05:39:45.209		35.73	-21.79	42236.19	-13.82		
6	I	2023-10-31T05:40:15.242		35.62	-21.68	41830.31	-13.44		

No planet occultations

6	E	2023-10-31T06:09:19.335		29.21	-15.31	41796.56	13.41		
5	E	2023-10-31T06:09:56.895		29.07	-15.18	42308.72	13.80		
4	E	2023-10-31T06:10:12.396		29.01	-15.12	42526.96	13.98		
alpha	E	2023-10-31T06:12:38.573		28.48	-14.59	44684.64	15.42		
beta	E	2023-10-31T06:13:41.771		28.24	-14.36	45675.69	15.98		
eta	E	2023-10-31T06:15:13.566		27.91	-14.02	47176.12	16.71		
gamma	E	2023-10-31T06:15:40.065		27.81	-13.93	47621.72	16.91		
delta	E	2023-10-31T06:16:19.840		27.67	-13.78	48300.35	17.21		
lambda	E	2023-10-31T06:17:58.230		27.31	-13.43	50026.71	17.87		
epsilon	E	2023-10-31T06:19:00.337		27.08	-13.20	51148.97	18.12		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-31T06:01:20.280
 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 : 55692192387889280
 2Mass ID (if available) : 03154552+1746085
 ICRS Star Coord at Epoch: 03h 15m 45.52050s +17:46:08.08736s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.541
 G magnitude : 14.329
 RP magnitude : 13.738
 BP magnitude : 14.758
 DUPflag : 0
 Distance (au) : 18.659
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.53
 Sun-Target sep (deg) : 165.94
 Sun-Moon sep (deg) : 17.93
 B (ring opening deg) : 62.70
 PA of pole (deg) : -88.77
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.769
 C/A sky separation (km) : 37467.5
 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

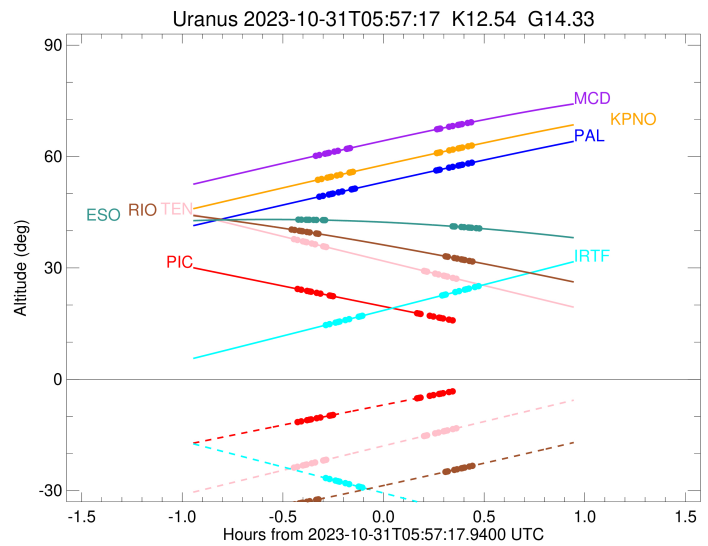
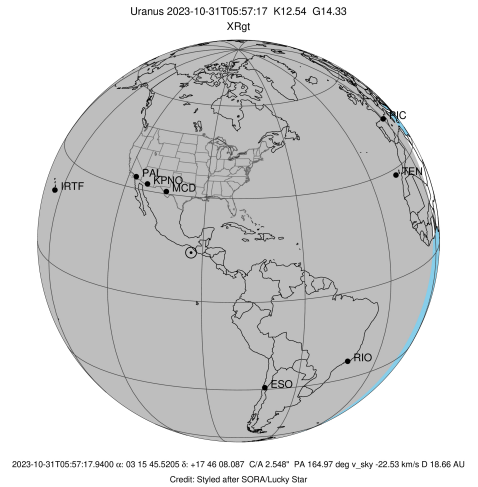


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-31T05:40:30.246		14.69	-26.71	50744.04	-16.82		
lambda	I	2023-10-31T05:41:13.298		14.86	-26.88	50026.71	-16.51		
delta	I	2023-10-31T05:43:00.471		15.27	-27.30	48300.35	-15.69		
gamma	I	2023-10-31T05:43:44.147		15.43	-27.47	47622.70	-15.33		
eta	I	2023-10-31T05:44:13.505		15.54	-27.58	47176.12	-15.09		
beta	I	2023-10-31T05:45:55.746		15.94	-27.98	45678.69	-14.16		
alpha	I	2023-10-31T05:47:05.972		16.20	-28.26	44705.34	-13.45		
4	I	2023-10-31T05:49:59.237		16.87	-28.93	42540.92	-11.56		
5	I	2023-10-31T05:50:24.912		16.96	-29.03	42245.63	-11.31		
6	I	2023-10-31T05:51:03.272		17.11	-29.18	41825.20	-10.78		

No planet occultations

6	E	2023-10-31T06:14:41.657		22.56	-34.73	41798.10	10.80		
5	E	2023-10-31T06:15:27.374		22.73	-34.91	42305.13	11.34		
4	E	2023-10-31T06:15:46.494		22.81	-34.98	42526.23	11.59		
alpha	E	2023-10-31T06:18:37.923		23.47	-35.65	44684.65	13.49		
beta	E	2023-10-31T06:19:49.624		23.74	-35.94	45676.70	14.21		
eta	E	2023-10-31T06:21:31.819		24.14	-36.34	47176.12	15.14		
gamma	E	2023-10-31T06:22:01.005		24.25	-36.45	47621.55	15.39		
delta	E	2023-10-31T06:22:44.606		24.42	-36.62	48300.35	15.75		
lambda	E	2023-10-31T06:24:31.389		24.83	-37.04	50026.71	16.57		
epsilon	E	2023-10-31T06:25:36.804		25.08	-37.30	51126.05	16.89		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-31T05:55:35.350
 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 : 55692192387889280
 2Mass ID (if available) : 03154552+1746085
 ICRS Star Coord at Epoch: 03h 15m 45.52050s +17:46:08.08736s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.541
 G magnitude : 14.329
 RP magnitude : 13.738
 BP magnitude : 14.758
 DUPflag : 0
 Distance (au) : 18.659
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.53
 Sun-Target sep (deg) : 165.94
 Sun-Moon sep (deg) : 17.21
 B (ring opening deg) : 62.70
 PA of pole (deg) : -88.77
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.208
 C/A sky separation (km) : 29884.0
 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

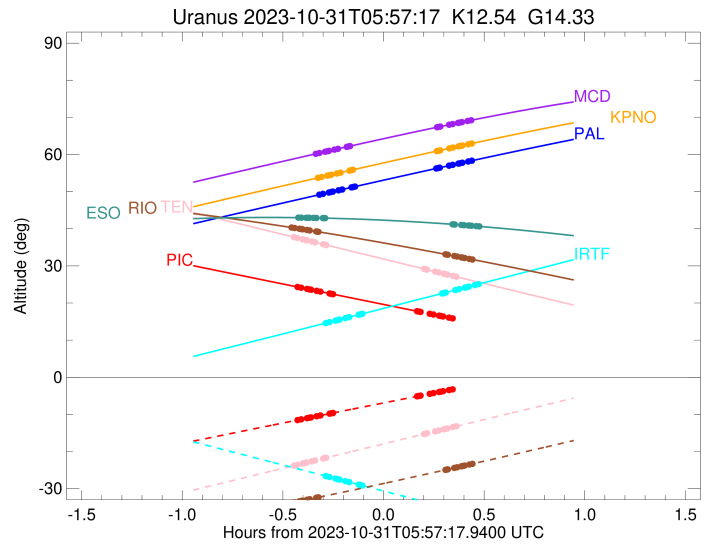
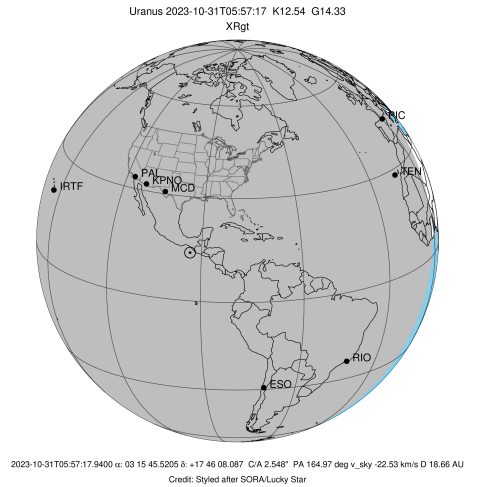


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-31T05:30:13.521		40.29	-33.79	50748.46	-20.55		
lambda	I	2023-10-31T05:30:48.754		40.21	-33.68	50026.71	-20.40		
delta	I	2023-10-31T05:32:14.255		40.00	-33.41	48300.35	-19.97		
gamma	I	2023-10-31T05:32:48.288		39.92	-33.31	47623.71	-19.79		
eta	I	2023-10-31T05:33:10.979		39.87	-33.24	47176.12	-19.66		
beta	I	2023-10-31T05:34:28.096		39.68	-33.00	45675.61	-19.21		
alpha	I	2023-10-31T05:35:18.434		39.56	-32.84	44714.21	-18.86		
4	I	2023-10-31T05:37:15.973		39.27	-32.47	42552.67	-18.02		
5	I	2023-10-31T05:37:34.165		39.23	-32.42	42220.34	-17.92		
6	I	2023-10-31T05:37:55.788		39.18	-32.35	41838.97	-17.69		

No planet occultations

6	E	2023-10-31T06:15:43.968		33.13	-24.96	41794.89	17.67		
5	E	2023-10-31T06:16:13.077		33.04	-24.86	42313.62	17.89		
4	E	2023-10-31T06:16:24.833		33.01	-24.82	42529.77	17.99		
alpha	E	2023-10-31T06:18:21.406		32.67	-24.43	44685.40	18.83		
beta	E	2023-10-31T06:19:13.450		32.52	-24.25	45673.12	19.18		
eta	E	2023-10-31T06:20:30.937		32.30	-23.99	47176.12	19.63		
gamma	E	2023-10-31T06:20:53.592		32.23	-23.91	47622.21	19.75		
delta	E	2023-10-31T06:21:27.764		32.14	-23.80	48300.35	19.94		
lambda	E	2023-10-31T06:22:53.429		31.89	-23.51	50026.71	20.36		
epsilon	E	2023-10-31T06:23:50.943		31.72	-23.31	51205.42	20.51		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-31T05:57:39.780
 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 : 55692192387889280
 2Mass ID (if available) : 03154552+1746085
 ICRS Star Coord at Epoch: 03h 15m 45.52050s +17:46:08.08736s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.541
 G magnitude : 14.329
 RP magnitude : 13.738
 BP magnitude : 14.758
 DUPflag : 0
 Distance (au) : 18.659
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.53
 Sun-Target sep (deg) : 165.94
 Sun-Moon sep (deg) : 17.62
 B (ring opening deg) : 62.70
 PA of pole (deg) : -88.77
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.198
 C/A sky separation (km) : 29750.3
 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_itrff93_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	2023-10-31T05:32:14.796		42.99	-44.06	50748.51	-20.62		
lambda	I	2023-10-31T05:32:49.913		42.99	-44.01	50026.71	-20.47		
delta	I	2023-10-31T05:34:15.103		42.97	-43.89	48300.35	-20.05		
gamma	I	2023-10-31T05:34:49.003		42.96	-43.84	47623.72	-19.87		
eta	I	2023-10-31T05:35:11.602		42.95	-43.81	47176.12	-19.74		
beta	I	2023-10-31T05:36:28.390		42.93	-43.69	45675.59	-19.29		
alpha	I	2023-10-31T05:37:18.488		42.92	-43.62	44714.27	-18.96		
4	I	2023-10-31T05:39:15.409		42.88	-43.44	42552.76	-18.12		
5	I	2023-10-31T05:39:33.508		42.88	-43.42	42220.18	-18.02		
6	I	2023-10-31T05:39:54.988		42.87	-43.38	41839.06	-17.80		

No planet occultations

6	E	2023-10-31T06:17:50.486		41.20	-39.19	41794.87	17.80		
5	E	2023-10-31T06:18:19.391		41.17	-39.13	42313.74	18.02		
4	E	2023-10-31T06:18:31.058		41.16	-39.10	42529.91	18.12		
alpha	E	2023-10-31T06:20:26.839		41.03	-38.85	44685.45	18.95		
beta	E	2023-10-31T06:21:18.549		40.97	-38.74	45673.01	19.29		
eta	E	2023-10-31T06:22:35.580		40.88	-38.57	47176.12	19.74		
gamma	E	2023-10-31T06:22:58.106		40.85	-38.52	47622.23	19.87		
delta	E	2023-10-31T06:23:32.084		40.81	-38.45	48300.35	20.05		
lambda	E	2023-10-31T06:24:57.282		40.71	-38.26	50026.71	20.47		
epsilon	E	2023-10-31T06:25:54.614		40.64	-38.13	51207.91	20.61		