

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-19T16:23:30.260
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3415726643709520768
 2Mass ID (if available) : 05115933+2304397

ICRS Star Coord at Epoch: 05h 11m 59.34070s +23:04:39.78016s

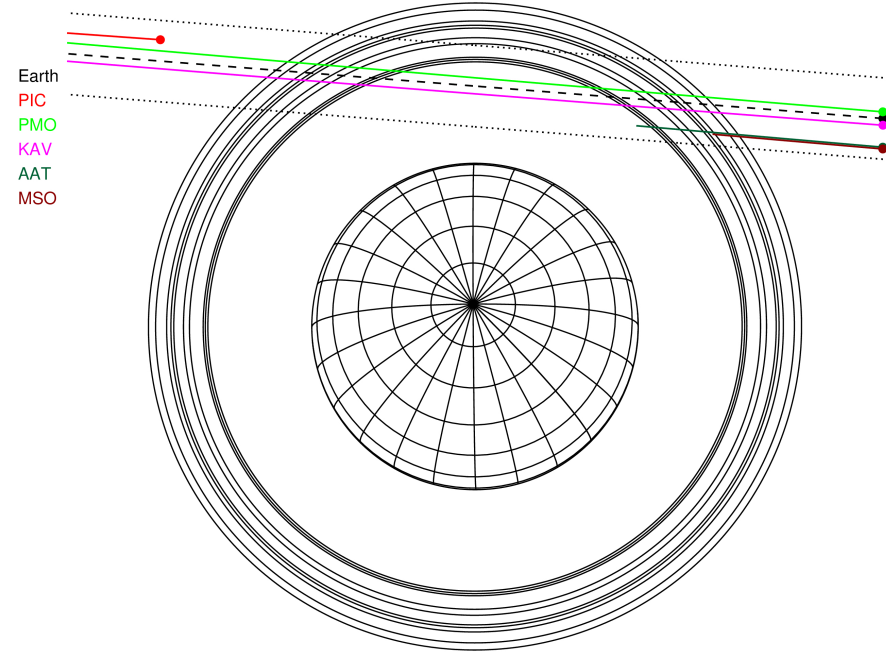
RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.731
 G magnitude : 16.826
 RP magnitude : 16.148
 BP magnitude : 17.336
 DUPflag : 0
 Distance (au) : 18.384
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.51
 Sun-Target sep (deg) : 140.01
 Sun-Moon sep (deg) : 171.16
 B (ring opening deg) : 82.07
 PA of pole (deg) : 4.81

#	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



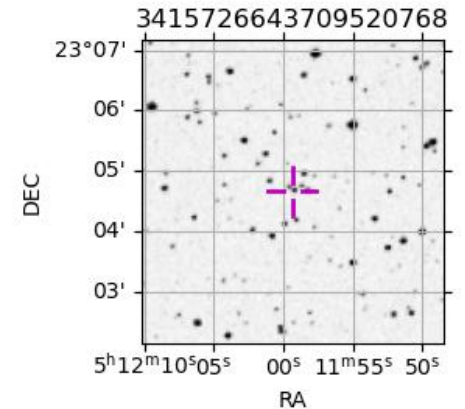
2031-01-19T16:23:30.2600 ex: 05 11 59.3407 s: +23 04 39.780 C/A 2.821" PA 175.46 deg v_sky -16.51 km/s D 18.38 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2031-01-19T16:23:30 K14.73 G16.83 XRgt

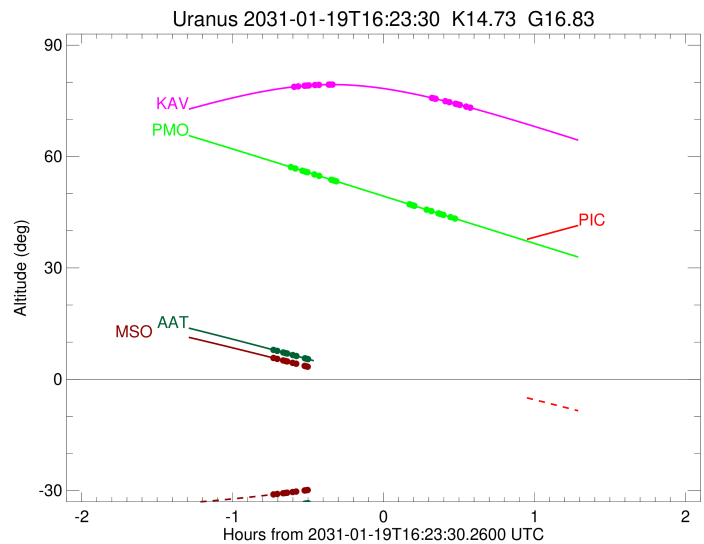
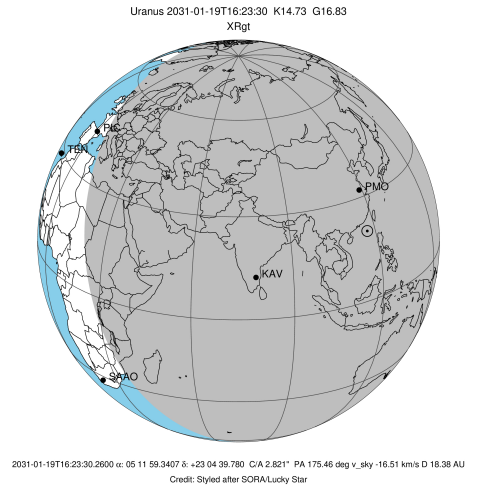


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	JAN 19 15:47 - JAN 19 16:51	PnnRie
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	JAN 19 15:48 - JAN 19 16:58	PnnRie
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European Southern Obs	-29.3	289.3					PnnRnn
AAT	Siding Spring (AAT)	-31.3	149.1	+++++			JAN 19 15:40 - JAN 19 15:53	PnnRin
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++			JAN 19 15:40 - JAN 19 15:43	PnnRin



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-19T16:19:23.690
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3415726643709520768
 2Mass ID (if available) : 05115933+2304397
 ICRS Star Coord at Epoch: 05h 11m 59.34070s +23:04:39.78016s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.731
 G magnitude : 16.826
 RP magnitude : 16.148
 BP magnitude : 17.336
 DUPflag : 0
 Distance (au) : 18.384
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.51
 Sun-Target sep (deg) : 140.01
 Sun-Moon sep (deg) : 171.89
 B (ring opening deg) : 82.07
 PA of pole (deg) : 4.81
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.911
 C/A sky separation (km) : 38813.1
 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

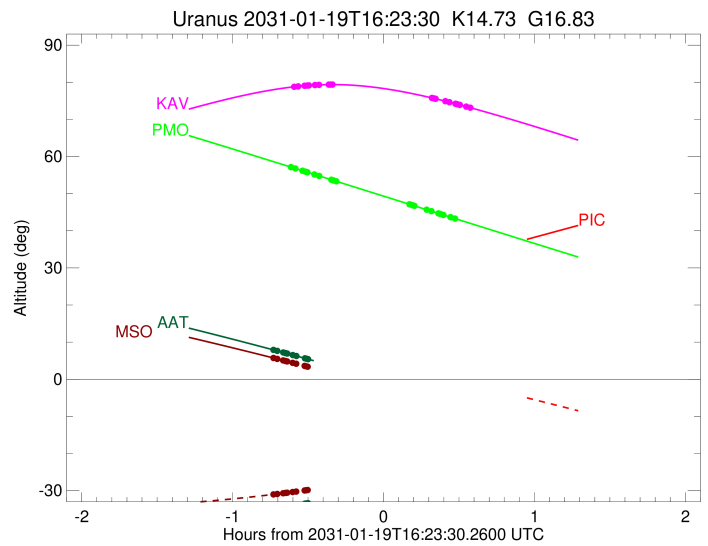
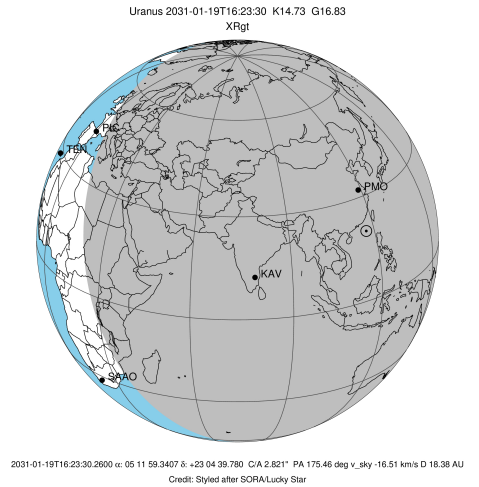


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-01-19T15:47:21.590		57.02	-76.80	50748.51	-10.72		
lambda	I	2031-01-19T15:48:29.741		56.77	-76.92	50026.71	-10.47		
delta	I	2031-01-19T15:51:19.560		56.18	-77.20	48300.35	-9.85		
gamma	I	2031-01-19T15:52:29.511		55.93	-77.30	47621.15	-9.57		
eta	I	2031-01-19T15:53:16.487		55.76	-77.37	47176.12	-9.38		
beta	I	2031-01-19T15:56:02.301		55.18	-77.60	45680.28	-8.65		
alpha	I	2031-01-19T15:57:58.505		54.77	-77.75	44705.54	-8.09		
4	I	2031-01-19T16:02:53.020		53.72	-78.05	42546.04	-6.53		
5	I	2031-01-19T16:03:37.714		53.57	-78.09	42254.54	-6.26		
6	I	2031-01-19T16:04:41.094		53.34	-78.14	41875.35	-5.91		

No planet occultations

6	E	2031-01-19T16:33:49.144		47.14	-77.67	41853.62	5.90		
5	E	2031-01-19T16:34:47.108		46.94	-77.60	42195.48	6.25		
4	E	2031-01-19T16:35:37.778		46.76	-77.53	42526.71	6.52		
alpha	E	2031-01-19T16:40:33.855		45.71	-77.09	44685.14	8.06		
beta	E	2031-01-19T16:42:31.254		45.29	-76.89	45664.84	8.62		
eta	E	2031-01-19T16:45:19.510		44.69	-76.59	47176.12	9.34		
gamma	E	2031-01-19T16:46:07.181		44.53	-76.50	47625.78	9.53		
delta	E	2031-01-19T16:47:16.968		44.28	-76.36	48300.35	9.80		
lambda	E	2031-01-19T16:50:07.625		43.67	-76.02	50026.71	10.42		
epsilon	E	2031-01-19T16:51:52.190		43.30	-75.80	51134.61	10.67		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-19T16:23:05.240
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 3415726643709520768
 2Mass ID (if available) : 05115933+2304397
 ICRS Star Coord at Epoch: 05h 11m 59.34070s +23:04:39.78016s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.731
 G magnitude : 16.826
 RP magnitude : 16.148
 BP magnitude : 17.336
 DUPflag : 0
 Distance (au) : 18.384
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.51
 Sun-Target sep (deg) : 140.01
 Sun-Moon sep (deg) : 171.37
 B (ring opening deg) : 82.07
 PA of pole (deg) : 4.81
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.725
 C/A sky separation (km) : 36328.3
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

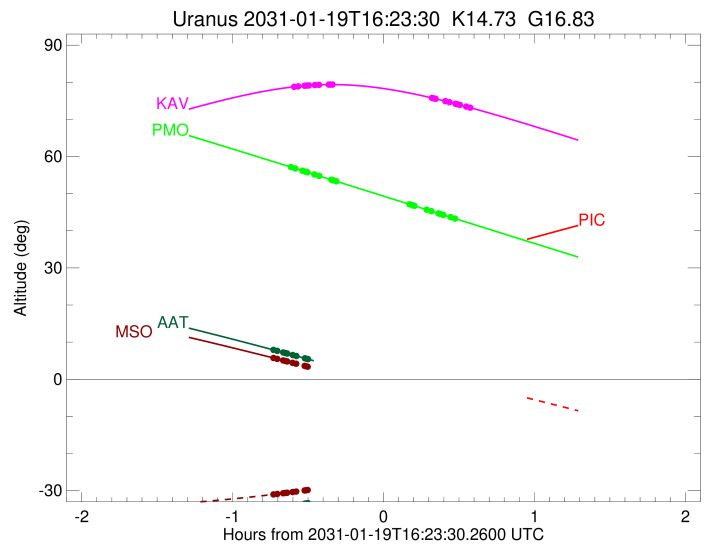
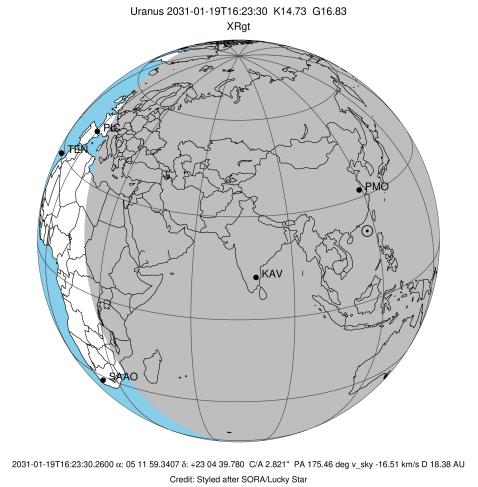


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-01-19T15:48:34.188		78.83	-44.68	50745.15	-11.74		
lambda	I	2031-01-19T15:49:35.910		78.91	-44.92	50026.71	-11.55		
delta	I	2031-01-19T15:52:08.686		79.07	-45.52	48300.35	-11.05		
gamma	I	2031-01-19T15:53:10.795		79.12	-45.76	47621.06	-10.83		
eta	I	2031-01-19T15:53:52.177		79.16	-45.92	47176.12	-10.68		
beta	I	2031-01-19T15:56:15.928		79.26	-46.48	45680.76	-10.12		
alpha	I	2031-01-19T15:57:53.884		79.31	-46.86	44708.74	-9.70		
4	I	2031-01-19T16:01:49.574		79.38	-47.78	42550.93	-8.59		
5	I	2031-01-19T16:02:22.808		79.38	-47.91	42264.48	-8.41		
6	I	2031-01-19T16:03:10.188		79.38	-48.10	41877.57	-8.18		

No planet occultations

6	E	2031-01-19T16:42:44.124		75.79	-57.32	41847.60	8.17		
5	E	2031-01-19T16:43:26.029		75.68	-57.48	42185.97	8.40		
4	E	2031-01-19T16:44:05.154		75.58	-57.63	42525.98	8.58		
alpha	E	2031-01-19T16:48:01.661		74.93	-58.54	44684.69	9.69		
beta	E	2031-01-19T16:49:40.443		74.65	-58.93	45662.75	10.11		
eta	E	2031-01-19T16:52:06.105		74.22	-59.49	47176.12	10.66		
gamma	E	2031-01-19T16:52:48.020		74.10	-59.65	47626.28	10.81		
delta	E	2031-01-19T16:53:49.722		73.92	-59.89	48300.35	11.03		
lambda	E	2031-01-19T16:56:22.697		73.46	-60.47	50026.71	11.53		
epsilon	E	2031-01-19T16:58:00.347		73.16	-60.85	51166.99	11.73		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-19T16:18:12.730
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 3415726643709520768
 2Mass ID (if available) : 05115933+2304397
 ICRS Star Coord at Epoch: 05h 11m 59.34070s +23:04:39.78016s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.731
 G magnitude : 16.826
 RP magnitude : 16.148
 BP magnitude : 17.336
 DUPflag : 0
 Distance (au) : 18.384
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.51
 Sun-Target sep (deg) : 140.01
 Sun-Moon sep (deg) : 171.87
 B (ring opening deg) : 82.07
 PA of pole (deg) : 4.81
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.515
 C/A sky separation (km) : 33527.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

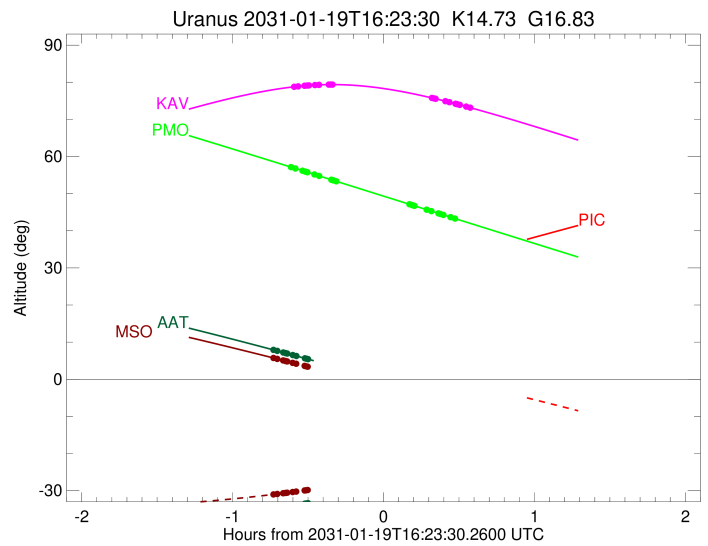
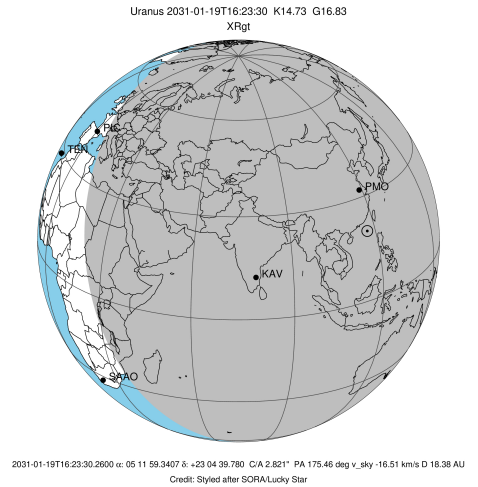


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-01-19T15:40:19.707		7.81	-34.63	50743.52	-12.44		
lambda	I	2031-01-19T15:41:17.644		7.64	-34.55	50026.71	-12.30		
delta	I	2031-01-19T15:43:40.224		7.21	-34.33	48300.35	-11.91		
gamma	I	2031-01-19T15:44:37.663		7.04	-34.24	47620.98	-11.74		
eta	I	2031-01-19T15:45:15.731		6.92	-34.18	47176.12	-11.63		
beta	I	2031-01-19T15:47:26.626		6.53	-33.98	45681.11	-11.21		
alpha	I	2031-01-19T15:48:54.171		6.26	-33.84	44712.46	-10.89		
4	I	2031-01-19T15:52:19.440		5.63	-33.50	42556.32	-10.09		
5	I	2031-01-19T15:52:47.301		5.55	-33.45	42274.05	-9.97		
6	I	2031-01-19T15:53:27.742		5.43	-33.39	41879.01	-9.81		

No planet occultations

6	E	2031-01-19T16:42:45.247		-3.92x	-27.50	41842.73	9.76		
5	E	2031-01-19T16:43:20.238		-4.04x	-27.42	42179.13	9.91		
4	E	2031-01-19T16:43:54.265		-4.15x	-27.35	42526.02	10.03		
alpha	E	2031-01-19T16:47:21.456		-4.82x	-26.87	44684.63	10.82		
beta	E	2031-01-19T16:48:50.388		-5.11x	-26.66	45660.98	11.13		
eta	E	2031-01-19T16:51:04.020		-5.55x	-26.35	47176.12	11.54		
gamma	E	2031-01-19T16:51:42.871		-5.68x	-26.26	47626.70	11.65		
delta	E	2031-01-19T16:52:40.271		-5.86x	-26.12	48300.35	11.82		
lambda	E	2031-01-19T16:55:04.025		-6.34x	-25.78	50026.71	12.19		
epsilon	E	2031-01-19T16:56:38.880		-6.65x	-25.55	51194.38	12.34		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-19T16:18:29.400
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : MSO
 Location : Mt. Stromlo Observatory
 Latitude (deg) : -35.32000
 E. Longitude (deg) : 149.00833
 Altitude (km) : 0.770
 Gaia source ID : 3415726643709520768
 2Mass ID (if available) : 05115933+2304397
 ICRS Star Coord at Epoch: 05h 11m 59.34070s +23:04:39.78016s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.731
 G magnitude : 16.826
 RP magnitude : 16.148
 BP magnitude : 17.336
 DUPflag : 0
 Distance (au) : 18.384
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.51
 Sun-Target sep (deg) : 140.01
 Sun-Moon sep (deg) : 171.82
 B (ring opening deg) : 82.07
 PA of pole (deg) : 4.81
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.492
 C/A sky separation (km) : 33228.5
 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_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	2031-01-19T15:40:19.416		5.64	-30.97	50743.52	-12.53		
lambda	I	2031-01-19T15:41:16.963		5.48	-30.89	50026.71	-12.38		
delta	I	2031-01-19T15:43:38.484		5.07	-30.70	48300.35	-12.01		
gamma	I	2031-01-19T15:44:35.451		4.91x	-30.62	47620.98	-11.84		
eta	I	2031-01-19T15:45:13.190		4.80x	-30.56	47176.12	-11.73		
beta	I	2031-01-19T15:47:22.844		4.43x	-30.38	45681.13	-11.32		
alpha	I	2031-01-19T15:48:49.424		4.18x	-30.25	44712.79	-11.02		
4	I	2031-01-19T15:52:12.046		3.59x	-29.95	42556.80	-10.24		
5	I	2031-01-19T15:52:39.471		3.51x	-29.90	42274.85	-10.12		
6	I	2031-01-19T15:53:19.346		3.39x	-29.84	41879.10	-9.97		

No planet occultations

6	E	2031-01-19T16:43:27.104		-5.69x	-24.31	41842.20	9.92		
5	E	2031-01-19T16:44:01.517		-5.79x	-24.24	42178.43	10.07		
4	E	2031-01-19T16:44:35.111		-5.90x	-24.17	42526.06	10.18		
alpha	E	2031-01-19T16:47:59.602		-6.54x	-23.73	44684.64	10.95		
beta	E	2031-01-19T16:49:27.544		-6.81x	-23.54	45660.77	11.24		
eta	E	2031-01-19T16:51:39.900		-7.23x	-23.25	47176.12	11.65		
gamma	E	2031-01-19T16:52:18.411		-7.35x	-23.16	47626.75	11.76		
delta	E	2031-01-19T16:53:15.320		-7.53x	-23.04	48300.35	11.91		
lambda	E	2031-01-19T16:55:37.969		-7.98x	-22.72	50026.71	12.28		
epsilon	E	2031-01-19T16:57:12.438		-8.27x	-22.51	51197.71	12.42		