

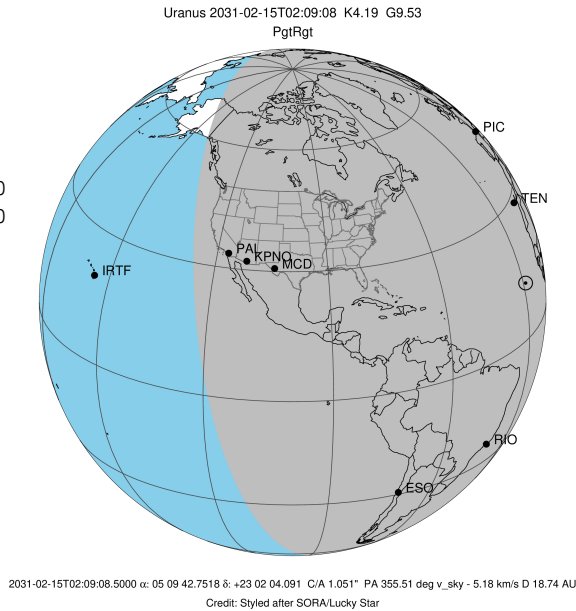
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-15T02:09:08.500
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3415397339976857728
 2Mass ID (if available) : 05094274+2302043

ICRS Star Coord at Epoch: 05h 09m 42.75176s +23:02:04.09125s

RUWE (>1.4 is poor) : 1.05
 K magnitude : 4.194
 G magnitude : 9.526
 RP magnitude : 8.105
 BP magnitude : 12.016
 DUPflag : 0
 Distance (au) : 18.741
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.18
 Sun-Target sep (deg) : 112.69
 Sun-Moon sep (deg) : 159.08
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.83

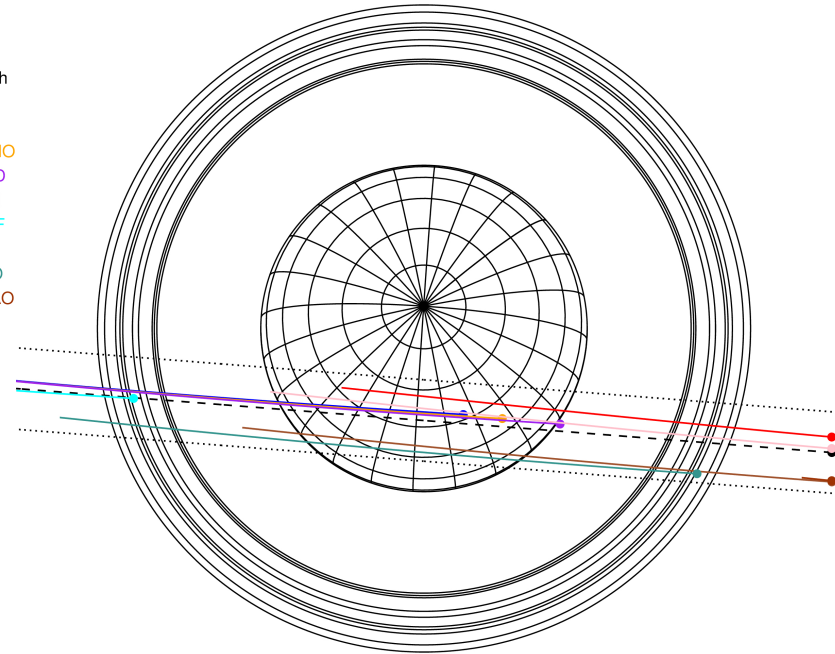
a(km) ring

- 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



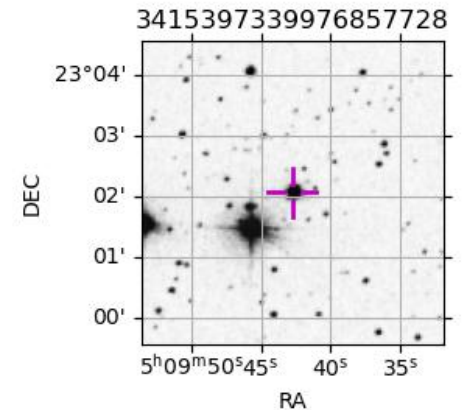
Uranus 2031-02-15T02:09:08 K4.19 G9.53 PgtRgt

Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 SAAO

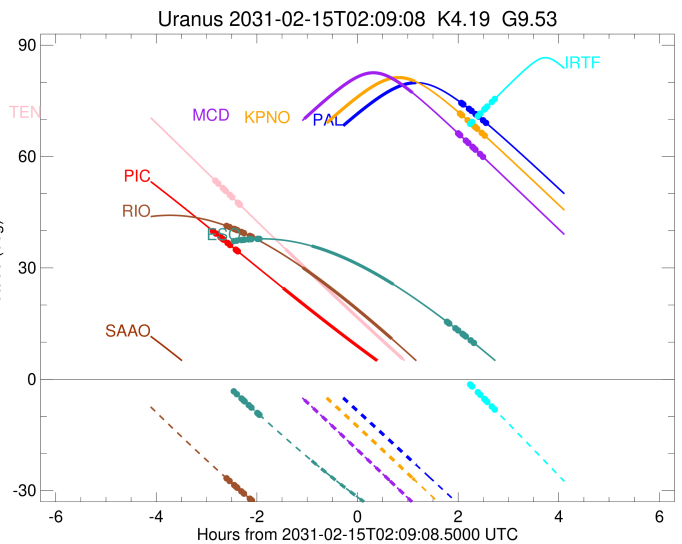
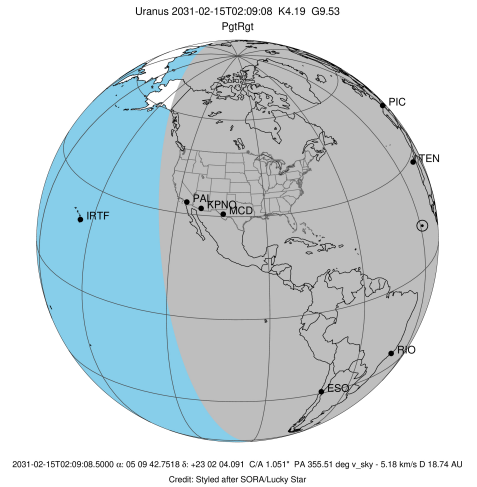


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+		FEB 14 23:16 - FEB 15 00:40	PinRin
PAL	Palomar Mt (200")	33.4	243.1		+	+++++	FEB 15 03:18 - FEB 15 04:43	PneRne
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4		+	+++++	FEB 15 03:17 - FEB 15 04:41	PneRne
MCD	McDonald Obs. 2.7m	30.7	256.0		+	+++++	FEB 15 01:05 - FEB 15 04:39	PieRne
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+		FEB 14 23:19 - FEB 15 03:03	PieRin
IRTF	Mauna Kea/IRTF	19.8	204.5			++++	FEB 15 04:40 - FEB 15 04:53	PnnRne
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+		FEB 14 23:32 - FEB 15 02:50	PieRin
ESO	European Southern Obs	-29.3	289.3	+++++	+	+++++	FEB 14 23:50 - FEB 15 04:28	PieRie
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

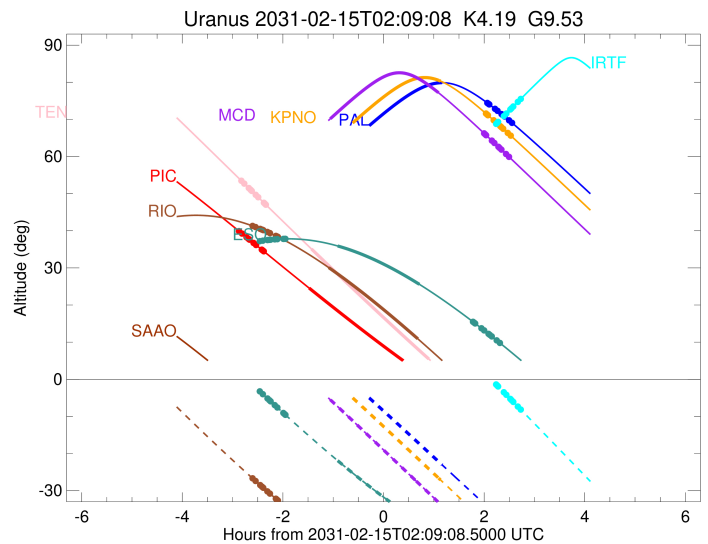
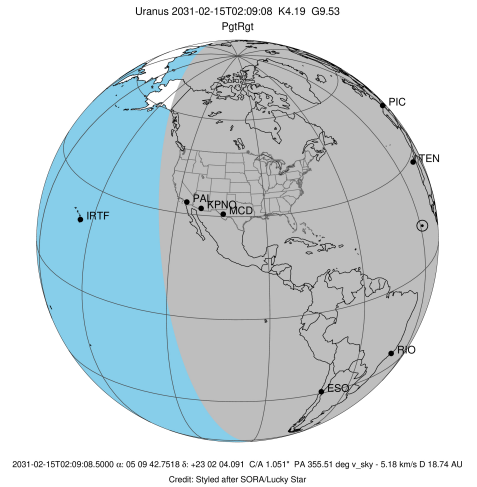


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-15T01:54:05.740
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3415397339976857728
 2Mass ID (if available) : 05094274+2302043
 ICRS Star Coord at Epoch: 05h 09m 42.75176s +23:02:04.09125s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 4.194
 G magnitude : 9.526
 RP magnitude : 8.105
 BP magnitude : 12.016
 DUPflag : 0
 Distance (au) : 18.740
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.18
 Sun-Target sep (deg) : 112.69
 Sun-Moon sep (deg) : 159.83
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.83
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.778
 C/A sky separation (km) : 10572.4
 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



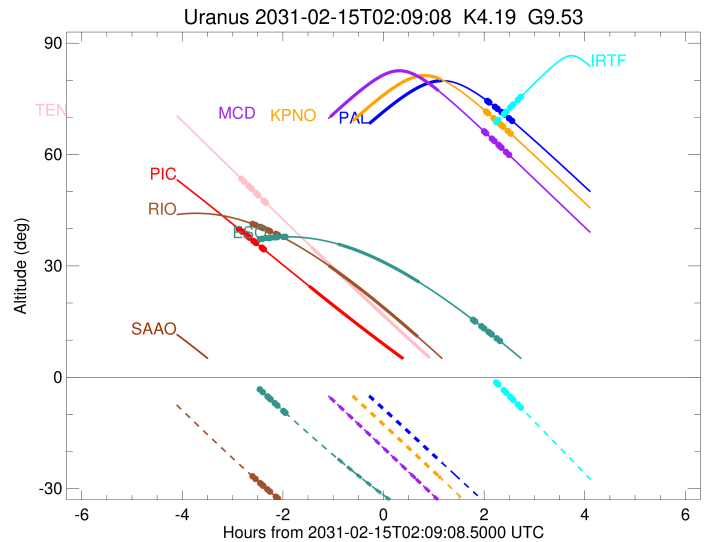
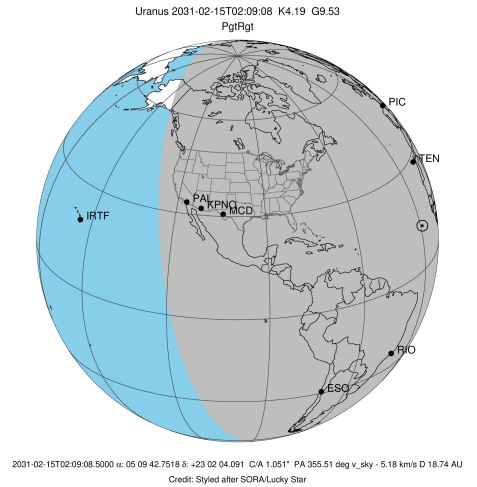
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-14T23:16:54.385		39.89	-57.67	51147.40	-5.32		
lambda	I	2031-02-14T23:20:25.694		39.24	-57.95	50026.71	-5.30		
delta	I	2031-02-14T23:25:52.071		38.25	-58.35	48300.35	-5.28		
gamma	I	2031-02-14T23:27:59.641		37.85	-58.50	47627.15	-5.27		
eta	I	2031-02-14T23:29:25.208		37.59	-58.59	47176.12	-5.27		
beta	I	2031-02-14T23:34:14.477		36.70	-58.89	45654.54	-5.25		
alpha	I	2031-02-14T23:37:06.936		36.18	-59.06	44750.20	-5.24		
4	I	2031-02-14T23:43:55.836		34.92	-59.40	42611.60	-5.21		
5	I	2031-02-14T23:45:05.164		34.71	-59.45	42251.60	-5.21		
6	I	2031-02-14T23:46:29.609		34.45	-59.51	41809.09	-5.20		
Uranus	I	2031-02-15T00:40:27.042		24.56	-59.50	25399.52		-4.08	-4.27
Uranus	E	2031-02-15T03:10:02.383		-0.93x	-41.62	25504.41		-2.38	-2.49
6	E	2031-02-15T04:07:47.066		-9.25x	-31.57	41846.41	4.77		
5	E	2031-02-15T04:08:57.809		-9.41x	-31.35	42182.66	4.77		
4	E	2031-02-15T04:10:09.537		-9.57x	-31.14	42525.94	4.77		
alpha	E	2031-02-15T04:17:41.710		-10.55x	-29.78	44684.81	4.78		
beta	E	2031-02-15T04:21:05.454		-10.98x	-29.17	45658.57	4.78		
eta	E	2031-02-15T04:26:22.925		-11.65x	-28.21	47176.12	4.78		
gamma	E	2031-02-15T04:27:57.386		-11.85x	-27.92	47627.72	4.78		
delta	E	2031-02-15T04:30:18.070		-12.14x	-27.49	48300.35	4.78		
lambda	E	2031-02-15T04:36:19.121		-12.87x	-26.40	50026.71	4.78		
epsilon	E	2031-02-15T04:40:47.093		-13.40x	-25.58	51308.01	4.79		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-15T02:13:11.480
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3415397339976857728
 2Mass ID (if available) : 05094274+2302043
 ICRS Star Coord at Epoch: 05h 09m 42.75176s +23:02:04.09125s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 4.194
 G magnitude : 9.526
 RP magnitude : 8.105
 BP magnitude : 12.016
 DUPflag : 0
 Distance (au) : 18.741
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.18
 Sun-Target sep (deg) : 112.69
 Sun-Moon sep (deg) : 159.19
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.83
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.960
 C/A sky separation (km) : 13052.3
 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



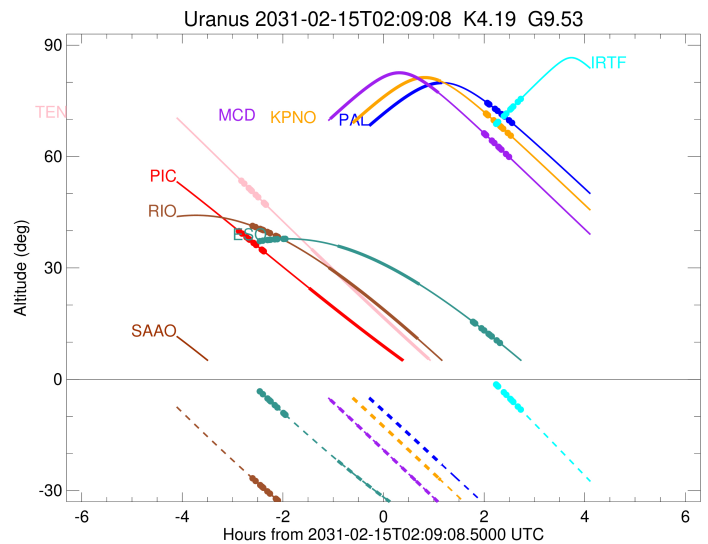
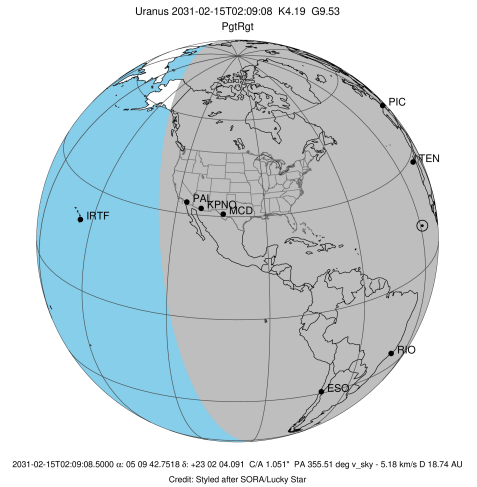
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-14T23:43:29.358		41.76	19.94x	51150.52	-5.27		
lambda	I	2031-02-14T23:47:03.329		42.51	19.30x	50026.71	-5.25		
delta	I	2031-02-14T23:52:32.461		43.66	18.31x	48300.35	-5.24		
gamma	I	2031-02-14T23:54:40.959		44.11	17.92x	47627.21	-5.24		
eta	I	2031-02-14T23:56:07.125		44.41	17.65x	47176.12	-5.23		
beta	I	2031-02-15T00:00:58.201		45.43	16.76x	45654.27	-5.22		
alpha	I	2031-02-15T00:03:51.532		46.04	16.23x	44750.00	-5.22		
4	I	2031-02-15T00:10:42.133		47.47	14.96x	42611.20	-5.20		
5	I	2031-02-15T00:11:51.914		47.72	14.74x	42250.03	-5.19		
6	I	2031-02-15T00:13:16.422		48.01	14.48x	41808.44	-5.19		
Uranus	I	2031-02-15T01:07:35.269		59.34	3.96x	25362.11		-4.54	-4.75
Uranus	E	2031-02-15T03:18:57.281		79.89	-23.04	25444.85		-3.45	-3.61
6	E	2031-02-15T04:12:56.105		74.44	-34.31	41842.45	5.22		
5	E	2031-02-15T04:14:00.607		74.26	-34.53	42177.20	5.22		
4	E	2031-02-15T04:15:07.045		74.07	-34.76	42526.24	5.23		
alpha	E	2031-02-15T04:21:59.177		72.87	-36.18	44685.27	5.25		
beta	E	2031-02-15T04:25:03.977		72.32	-36.82	45656.83	5.26		
eta	E	2031-02-15T04:29:52.477		71.44	-37.81	47176.12	5.27		
gamma	E	2031-02-15T04:31:18.200		71.18	-38.10	47628.15	5.27		
delta	E	2031-02-15T04:33:25.584		70.78	-38.54	48300.35	5.28		
lambda	E	2031-02-15T04:38:52.281		69.76	-39.66	50026.71	5.29		
epsilon	E	2031-02-15T04:42:59.934		68.97	-40.50	51337.41	5.31		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-15T02:11:56.230
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3415397339976857728
 2Mass ID (if available) : 05094274+2302043
 ICRS Star Coord at Epoch: 05h 09m 42.75176s +23:02:04.09125s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 4.194
 G magnitude : 9.526
 RP magnitude : 8.105
 BP magnitude : 12.016
 DUPflag : 0
 Distance (au) : 18.741
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.18
 Sun-Target sep (deg) : 112.69
 Sun-Moon sep (deg) : 159.26
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.83
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.977
 C/A sky separation (km) : 13279.2
 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



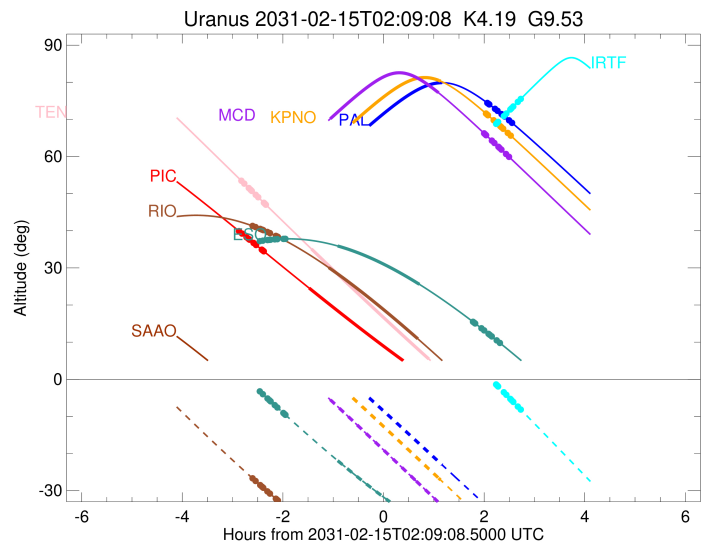
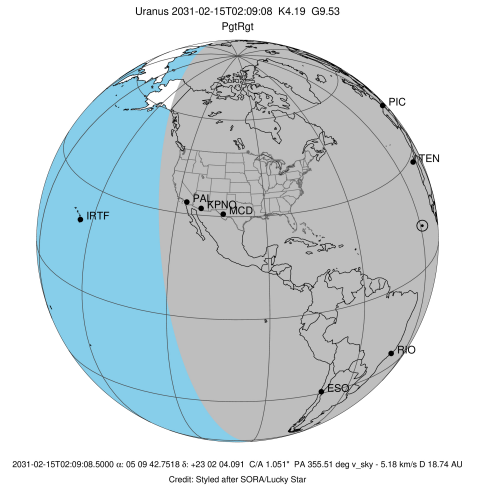
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-14T23:43:02.844		46.06	16.83x	51153.03	-5.29		
lambda	I	2031-02-14T23:46:36.367		46.82	16.15x	50026.71	-5.27		
delta	I	2031-02-14T23:52:04.128		47.99	15.12x	48300.35	-5.26		
gamma	I	2031-02-14T23:54:12.101		48.44	14.71x	47627.24	-5.26		
eta	I	2031-02-14T23:55:37.932		48.75	14.43x	47176.12	-5.25		
beta	I	2031-02-15T00:00:27.911		49.78	13.50x	45654.14	-5.24		
alpha	I	2031-02-15T00:03:20.595		50.39	12.95x	44749.92	-5.23		
4	I	2031-02-15T00:10:09.775		51.84	11.62x	42611.04	-5.21		
5	I	2031-02-15T00:11:19.408		52.09	11.39x	42249.45	-5.21		
6	I	2031-02-15T00:12:43.567		52.39	11.12x	41808.21	-5.20		
Uranus	I	2031-02-15T01:06:59.606		63.84	0.23x	25355.22		-4.62	-4.84
Uranus	E	2031-02-15T03:17:09.267		80.32	-27.12	25440.96		-3.50	-3.67
6	E	2031-02-15T04:11:18.972		71.59	-38.56	41842.30	5.21		
5	E	2031-02-15T04:12:23.621		71.38	-38.79	42177.00	5.21		
4	E	2031-02-15T04:13:30.249		71.16	-39.02	42526.26	5.22		
alpha	E	2031-02-15T04:20:23.337		69.80	-40.46	44685.29	5.24		
beta	E	2031-02-15T04:23:28.549		69.18	-41.10	45656.77	5.25		
eta	E	2031-02-15T04:28:17.730		68.21	-42.10	47176.12	5.26		
gamma	E	2031-02-15T04:29:43.655		67.92	-42.40	47628.16	5.26		
delta	E	2031-02-15T04:31:51.335		67.49	-42.84	48300.35	5.27		
lambda	E	2031-02-15T04:37:18.806		66.37	-43.97	50026.71	5.28		
epsilon	E	2031-02-15T04:41:27.213		65.52	-44.82	51338.24	5.29		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-15T02:10:00.060
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3415397339976857728
 2Mass ID (if available) : 05094274+2302043
 ICRS Star Coord at Epoch: 05h 09m 42.75176s +23:02:04.09125s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 4.194
 G magnitude : 9.526
 RP magnitude : 8.105
 BP magnitude : 12.016
 DUPflag : 0
 Distance (au) : 18.741
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.18
 Sun-Target sep (deg) : 112.69
 Sun-Moon sep (deg) : 159.37
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.83
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.994
 C/A sky separation (km) : 13506.2
 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



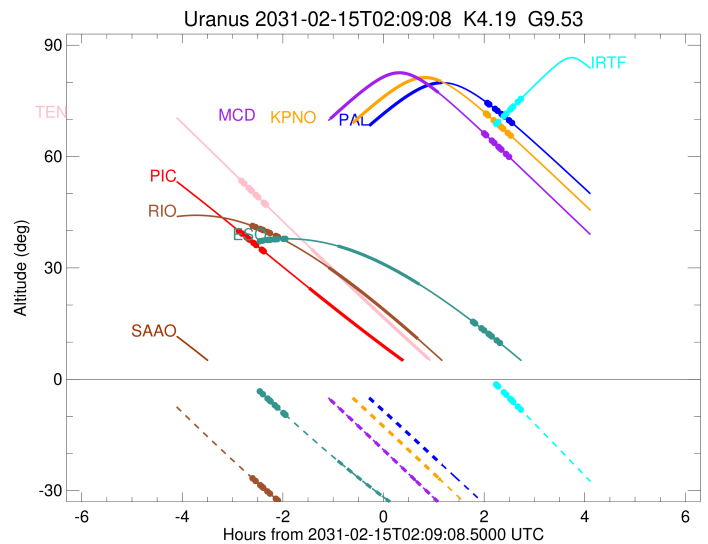
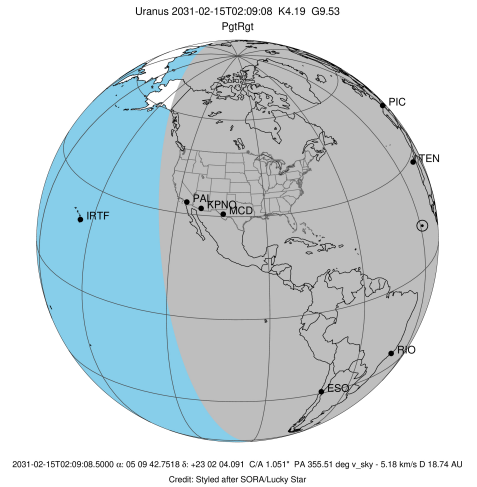
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-14T23:42:01.361		52.33	11.69x	51155.99	-5.32		
lambda	I	2031-02-14T23:45:34.199		53.09	10.98x	50026.71	-5.30		
delta	I	2031-02-14T23:51:00.120		54.27	9.90x	48300.35	-5.29		
gamma	I	2031-02-14T23:53:07.390		54.72	9.47x	47627.28	-5.29		
eta	I	2031-02-14T23:54:32.770		55.03	9.19x	47176.12	-5.28		
beta	I	2031-02-14T23:59:21.271		56.07	8.22x	45653.99	-5.27		
alpha	I	2031-02-15T00:02:13.085		56.69	7.64x	44749.81	-5.26		
4	I	2031-02-15T00:09:00.345		58.15	6.26x	42610.85	-5.24		
5	I	2031-02-15T00:10:09.757		58.40	6.02x	42248.78	-5.23		
6	I	2031-02-15T00:11:33.459		58.70	5.74x	41807.95	-5.23		
Uranus	I	2031-02-15T01:05:44.225		70.18	-5.52	25347.58		-4.71	-4.93
Uranus	E	2031-02-15T03:14:42.403		77.19	-33.14	25437.55		-3.56	-3.72
6	E	2031-02-15T04:09:07.616		66.25	-44.71	41842.20	5.19		
5	E	2031-02-15T04:10:12.524		66.02	-44.94	42176.87	5.19		
4	E	2031-02-15T04:11:19.445		65.78	-45.17	42526.27	5.20		
alpha	E	2031-02-15T04:18:14.217		64.32	-46.62	44685.31	5.22		
beta	E	2031-02-15T04:21:20.182		63.66	-47.26	45656.73	5.23		
eta	E	2031-02-15T04:26:10.576		62.63	-48.27	47176.12	5.24		
gamma	E	2031-02-15T04:27:36.865		62.32	-48.57	47628.17	5.24		
delta	E	2031-02-15T04:29:45.087		61.86	-49.01	48300.35	5.24		
lambda	E	2031-02-15T04:35:13.971		60.69	-50.13	50026.71	5.25		
epsilon	E	2031-02-15T04:39:23.551		59.79	-50.98	51338.66	5.27		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-15T01:52:03.340
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3415397339976857728
 2Mass ID (if available) : 05094274+2302043
 ICRS Star Coord at Epoch: 05h 09m 42.75176s +23:02:04.09125s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 4.194
 G magnitude : 9.526
 RP magnitude : 8.105
 BP magnitude : 12.016
 DUPflag : 0
 Distance (au) : 18.740
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.18
 Sun-Target sep (deg) : 112.69
 Sun-Moon sep (deg) : 160.00
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.83
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.917
 C/A sky separation (km) : 12465.2
 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



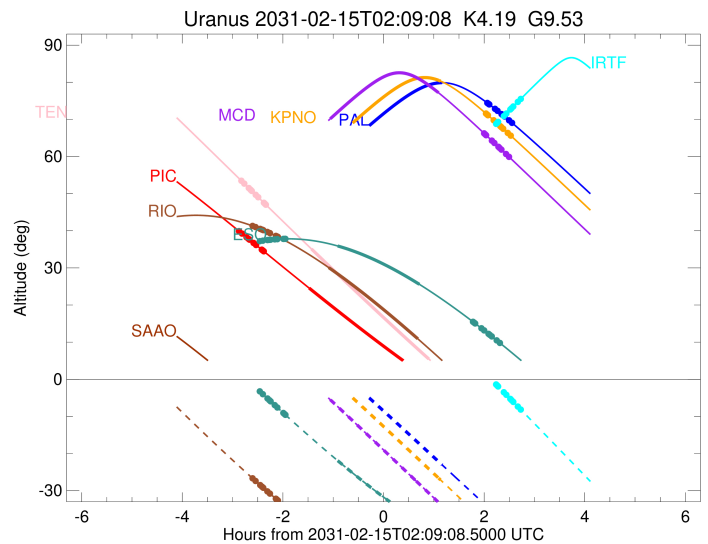
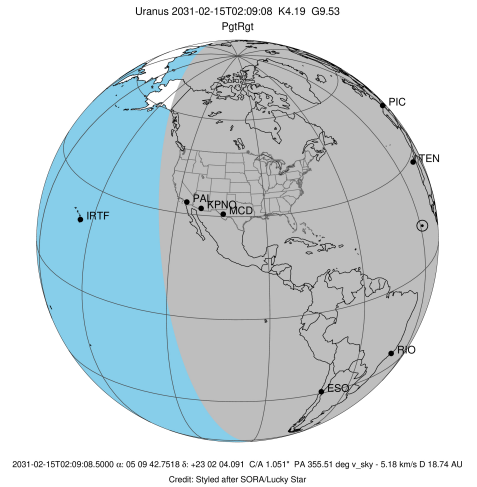
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-14T23:19:39.194		53.47	-58.05	51162.69	-5.39		
lambda	I	2031-02-14T23:23:10.832		52.69	-58.77	50026.71	-5.36		
delta	I	2031-02-14T23:28:33.471		51.50	-59.85	48300.35	-5.34		
gamma	I	2031-02-14T23:30:39.595		51.04	-60.27	47627.36	-5.33		
eta	I	2031-02-14T23:32:04.277		50.73	-60.55	47176.12	-5.33		
beta	I	2031-02-14T23:36:50.691		49.67	-61.49	45653.73	-5.30		
alpha	I	2031-02-14T23:39:41.416		49.04	-62.04	44749.64	-5.29		
4	I	2031-02-14T23:46:26.696		47.55	-63.34	42610.60	-5.26		
5	I	2031-02-14T23:47:35.963		47.30	-63.56	42247.89	-5.25		
6	I	2031-02-14T23:48:59.258		46.99	-63.83	41807.61	-5.24		
Uranus	I	2031-02-15T00:43:10.596		35.11	-72.42	25353.45		-4.64	-4.86
Uranus	E	2031-02-15T03:03:15.312		5.45	-61.48	25474.17		-2.97	-3.11
6	E	2031-02-15T04:01:29.130		-6.05x	-49.43	41844.63	4.77		
5	E	2031-02-15T04:02:39.751		-6.27x	-49.18	42180.15	4.77		
4	E	2031-02-15T04:03:51.891		-6.50x	-48.92	42526.03	4.78		
alpha	E	2031-02-15T04:11:23.554		-7.93x	-47.30	44684.98	4.79		
beta	E	2031-02-15T04:14:46.757		-8.57x	-46.57	45657.81	4.79		
eta	E	2031-02-15T04:20:03.782		-9.55x	-45.43	47176.12	4.79		
gamma	E	2031-02-15T04:21:38.088		-9.84x	-45.09	47627.90	4.79		
delta	E	2031-02-15T04:23:58.439		-10.28x	-44.58	48300.35	4.79		
lambda	E	2031-02-15T04:29:58.695		-11.38x	-43.27	50026.71	4.79		
epsilon	E	2031-02-15T04:34:28.580		-12.20x	-42.29	51320.09	4.80		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-15T02:23:05.960
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3415397339976857728
 2Mass ID (if available) : 05094274+2302043
 ICRS Star Coord at Epoch: 05h 09m 42.75176s +23:02:04.09125s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 4.194
 G magnitude : 9.526
 RP magnitude : 8.105
 BP magnitude : 12.016
 DUPflag : 0
 Distance (au) : 18.741
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.18
 Sun-Target sep (deg) : 112.69
 Sun-Moon sep (deg) : 158.59
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.83
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.991
 C/A sky separation (km) : 13464.0
 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



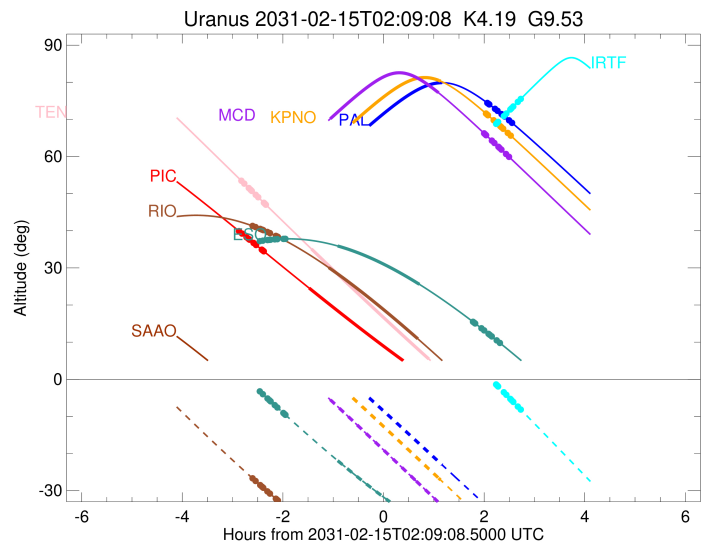
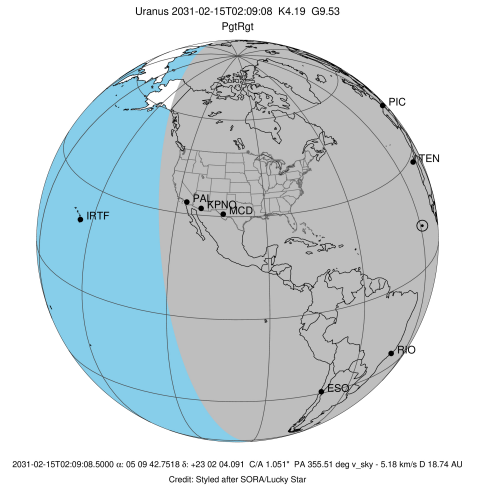
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-14T23:48:41.646		6.38	52.88x	51149.08	-5.03		
lambda	I	2031-02-14T23:52:25.473		7.19	52.43x	50026.71	-5.01		
delta	I	2031-02-14T23:58:10.070		8.45	51.70x	48300.35	-5.01		
gamma	I	2031-02-15T00:00:24.563		8.94	51.41x	47627.19	-5.00		
eta	I	2031-02-15T00:01:54.730		9.27	51.21x	47176.12	-5.00		
beta	I	2031-02-15T00:06:59.236		10.39	50.52x	45654.32	-4.99		
alpha	I	2031-02-15T00:10:00.513		11.06	50.09x	44750.04	-4.99		
4	I	2031-02-15T00:17:09.748		12.64	49.05x	42611.25	-4.97		
5	I	2031-02-15T00:18:22.646		12.91	48.86x	42250.22	-4.97		
6	I	2031-02-15T00:19:50.976		13.23	48.64x	41808.51	-4.96		
Uranus	I	2031-02-15T01:16:32.515		25.93	38.84x	25359.52		-4.57	-4.79
Uranus	E	2031-02-15T03:28:57.868		56.23	10.96x	25427.55		-3.70	-3.88
6	E	2031-02-15T04:23:27.067		68.79	-1.39x	41841.27	5.22		
5	E	2031-02-15T04:24:31.570		69.04	-1.64x	42175.68	5.22		
4	E	2031-02-15T04:25:38.285		69.29	-1.89x	42526.41	5.23		
alpha	E	2031-02-15T04:32:30.030		70.87	-3.47x	44685.46	5.26		
beta	E	2031-02-15T04:35:34.273		71.57	-4.17x	45656.30	5.27		
eta	E	2031-02-15T04:40:21.951		72.67	-5.28	47176.12	5.29		
gamma	E	2031-02-15T04:41:47.361		72.99	-5.61	47628.28	5.30		
delta	E	2031-02-15T04:43:54.167		73.47	-6.09	48300.35	5.30		
lambda	E	2031-02-15T04:49:19.157		74.71	-7.34	50026.71	5.32		
epsilon	E	2031-02-15T04:53:27.002		75.65	-8.30	51346.77	5.34		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-15T01:56:14.130
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3415397339976857728
 2Mass ID (if available) : 05094274+2302043
 ICRS Star Coord at Epoch: 05h 09m 42.75176s +23:02:04.09125s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 4.194
 G magnitude : 9.526
 RP magnitude : 8.105
 BP magnitude : 12.016
 DUPflag : 0
 Distance (au) : 18.740
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.18
 Sun-Target sep (deg) : 112.69
 Sun-Moon sep (deg) : 159.85
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.83
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.352
 C/A sky separation (km) : 18372.8
 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	2031-02-14T23:32:51.823		41.32	-26.65	51208.15	-5.26		
lambda	I	2031-02-14T23:36:37.708		41.00	-27.41	50026.71	-5.22		
delta	I	2031-02-14T23:42:09.569		40.51	-28.52	48300.35	-5.18		
gamma	I	2031-02-14T23:44:19.440		40.30	-28.95	47627.99	-5.17		
eta	I	2031-02-14T23:45:46.933		40.17	-29.24	47176.12	-5.16		
beta	I	2031-02-14T23:50:43.477		39.68	-30.22	45651.38	-5.12		
alpha	I	2031-02-14T23:53:40.398		39.38	-30.80	44747.57	-5.10		
4	I	2031-02-15T00:00:42.380		38.63	-32.16	42607.03	-5.04		
5	I	2031-02-15T00:01:56.220		38.49	-32.40	42236.45	-5.02		
6	I	2031-02-15T00:03:21.740		38.33	-32.68	41803.52	-5.01		
Uranus	I	2031-02-15T01:03:50.340		30.08	-43.38	25186.05		-6.29	-6.58
Uranus	E	2031-02-15T02:50:07.745		10.89	-54.23	25318.11		-5.03	-5.27
6	E	2031-02-15T03:53:41.854	-2.15x	-52.69	41837.92	4.66			
5	E	2031-02-15T03:54:54.043	-2.41x	-52.60	42171.67	4.67			
4	E	2031-02-15T03:56:09.519	-2.67x	-52.50	42527.04	4.68			
alpha	E	2031-02-15T04:03:49.545	-4.30x	-51.86	44686.07	4.71			
beta	E	2031-02-15T04:07:14.684	-5.02x	-51.54	45655.01	4.73			
eta	E	2031-02-15T04:12:35.691	-6.16x	-51.02	47176.12	4.75			
gamma	E	2031-02-15T04:14:10.943	-6.50x	-50.86	47628.57	4.75			
delta	E	2031-02-15T04:16:32.184	-7.01x	-50.62	48300.35	4.76			
lambda	E	2031-02-15T04:22:34.259	-8.30x	-49.96	50026.71	4.78			
epsilon	E	2031-02-15T04:27:14.182	-9.31x	-49.42	51365.01	4.80			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-15T02:02:42.230
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3415397339976857728
 2Mass ID (if available) : 05094274+2302043
 ICRS Star Coord at Epoch: 05h 09m 42.75176s +23:02:04.09125s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 4.194
 G magnitude : 9.526
 RP magnitude : 8.105
 BP magnitude : 12.016
 DUPflag : 0
 Distance (au) : 18.740
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.18
 Sun-Target sep (deg) : 112.69
 Sun-Moon sep (deg) : 159.58
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.83
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.423
 C/A sky separation (km) : 19342.0
 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	2031-02-14T23:41:28.254		37.20	-3.23x	51211.17	-5.20		
lambda	I	2031-02-14T23:45:17.267		37.33	-4.03x	50026.71	-5.16		
delta	I	2031-02-14T23:50:52.856		37.50	-5.19	48300.35	-5.13		
gamma	I	2031-02-14T23:53:04.179		37.56	-5.65	47628.04	-5.11		
eta	I	2031-02-14T23:54:32.667		37.59	-5.95	47176.12	-5.10		
beta	I	2031-02-14T23:59:32.614		37.69	-6.99	45651.19	-5.06		
alpha	I	2031-02-15T00:02:31.574		37.74	-7.61	44747.37	-5.04		
4	I	2031-02-15T00:09:38.568		37.81	-9.07	42606.67	-4.98		
5	I	2031-02-15T00:10:53.437		37.82	-9.33	42235.41	-4.96		
6	I	2031-02-15T00:12:19.859		37.83	-9.62	41803.18	-4.95		
Uranus	I	2031-02-15T01:14:23.381		35.91	-21.90	25161.14		-6.50	-6.80
Uranus	E	2031-02-15T02:52:01.547		25.56	-38.39	25276.89		-5.45	-5.71
6	E	2031-02-15T03:55:50.346		15.49	-45.61	41836.30	4.74		
5	E	2031-02-15T03:57:01.315		15.29	-45.71	42169.86	4.75		
4	E	2031-02-15T03:58:15.853		15.07	-45.81	42527.44	4.76		
alpha	E	2031-02-15T04:05:47.194		13.76	-46.36	44686.44	4.81		
beta	E	2031-02-15T04:09:07.920		13.17	-46.58	45654.34	4.83		
eta	E	2031-02-15T04:14:22.165		12.24	-46.90	47176.12	4.85		
gamma	E	2031-02-15T04:15:55.328		11.96	-46.99	47628.73	4.86		
delta	E	2031-02-15T04:18:13.329		11.55	-47.11	48300.35	4.87		
lambda	E	2031-02-15T04:24:06.869		10.49	-47.40	50026.71	4.89		
epsilon	E	2031-02-15T04:28:42.107		9.65	-47.60	51375.83	4.92		