

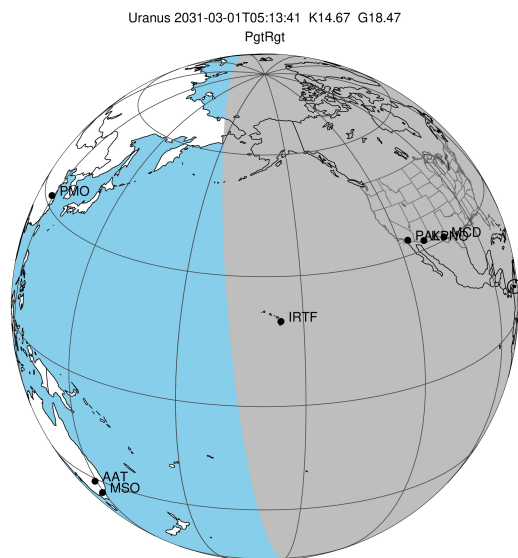
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-03-01T05:13:41.120
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3415408747410005632
 2Mass ID (if available) : 05093215+2301564

Uranus 2031-03-01T05:13:41 K14.67 G18.47 PgtRgt

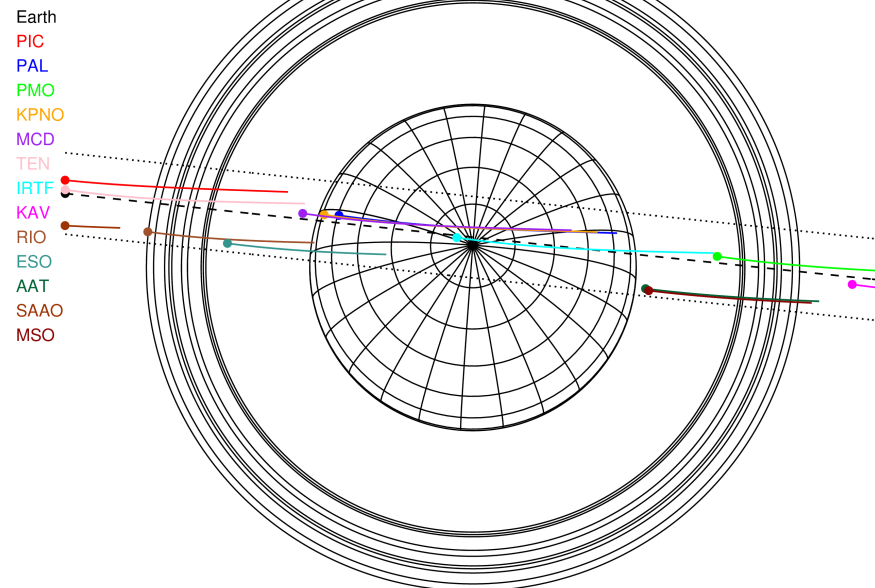
ICRS Star Coord at Epoch: 05h 09m 32.14296s +23:01:56.30520s

RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.674
 G magnitude : 18.469
 RP magnitude : 17.314
 BP magnitude : 19.955
 DUPflag : 0
 Distance (au) : 18.970
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.97
 Sun-Target sep (deg) : 98.42
 Sun-Moon sep (deg) : 7.94
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.51

#	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

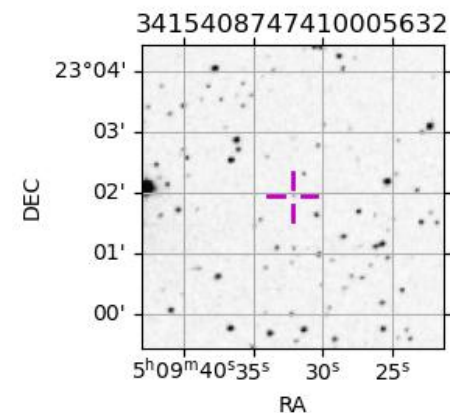


2031-03-01T05:13:41.1200 ra: 05 09 32.1430 s: +23 01 56.305 C/A 0.950° PA 182.31 deg v_sky + 1.98 km/s D 18.97 AU
 Credit: Styled after SORA/Lucky Star

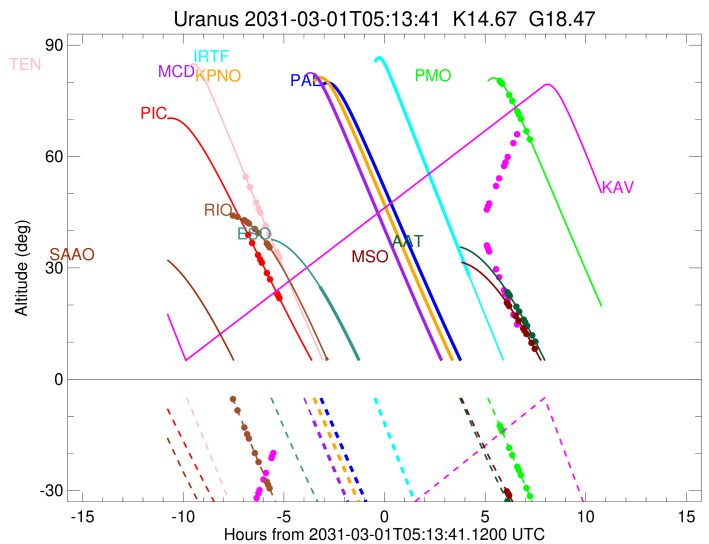
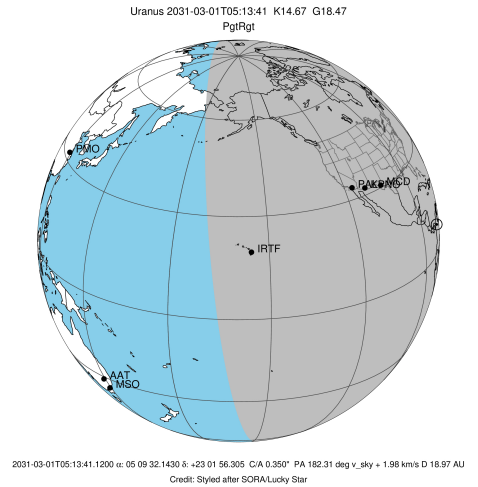


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++++			FEB 28 22:28 - MAR 01 00:00	PnnRin
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8			+++++++	MAR 01 10:56 - MAR 01 12:27	PnnRne
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0		+		MAR 01 01:42 - MAR 01 01:42	PinRnn
TEN	Teide Obs./Tenerife	28.3	343.5	+++++++			FEB 28 22:20 - FEB 28 23:59	PnnRin
IRTF	Mauna Kea/IRTF	19.8	204.5		+		MAR 01 09:26 - MAR 01 09:26	PneRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++++	+		FEB 28 21:42 - MAR 01 02:20	PinRin
ESO	European Southern Obs	-29.3	289.3		+		MAR 01 02:00 - MAR 01 02:00	PinRnn
AAT	Siding Spring (AAT)	-31.3	149.1			+++++++	MAR 01 11:19 - MAR 01 12:44	PnnRne
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0			+++++++	MAR 01 11:17 - MAR 01 12:41	PnnRne

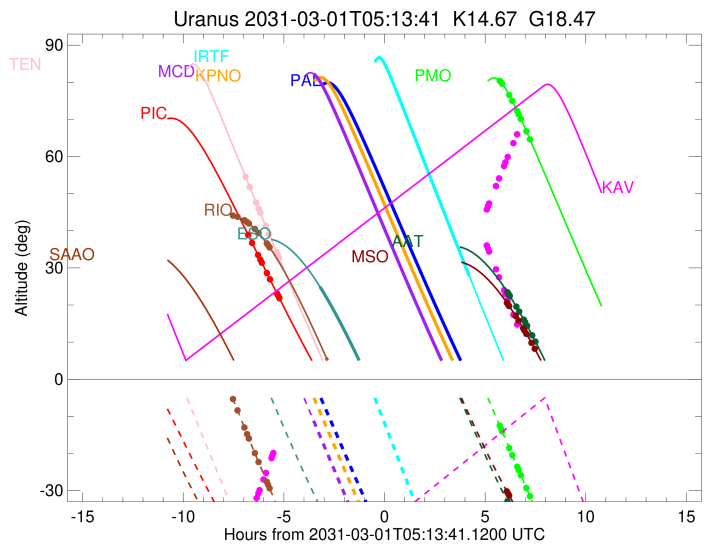
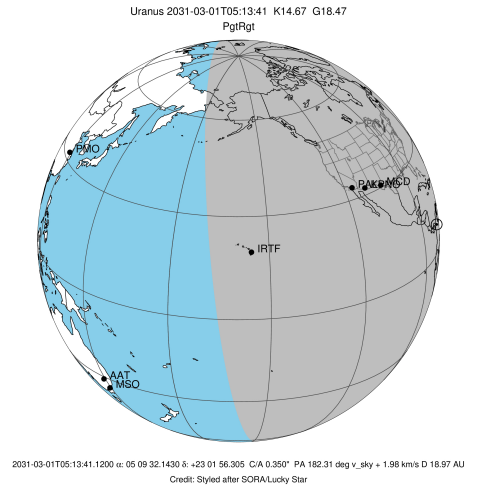


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-03-01T05:27:23.420
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3415408747410005632
 2Mass ID (if available) : 05093215+2301564
 ICRS Star Coord at Epoch: 05h 09m 32.14296s +23:01:56.30520s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.674
 G magnitude : 18.469
 RP magnitude : 17.314
 BP magnitude : 19.955
 DUPflag : 0
 Distance (au) : 18.971
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.97
 Sun-Target sep (deg) : 98.42
 Sun-Moon sep (deg) : 8.31
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.748
 C/A sky separation (km) : 10289.0
 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



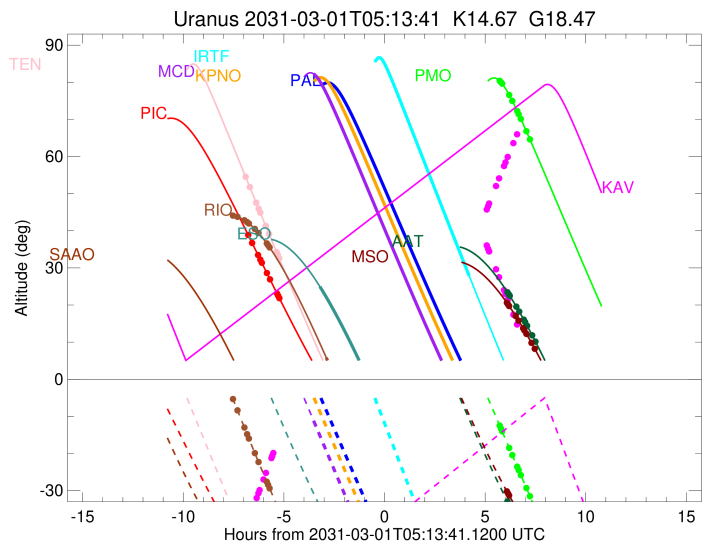
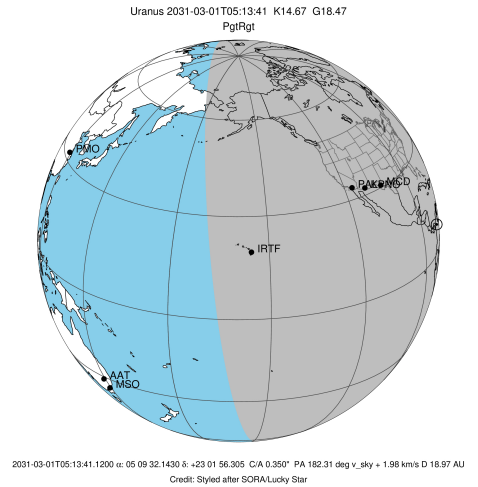
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-28T22:28:41.730		38.60	-48.32	51036.15	-1.60		
lambda	I	2031-02-28T22:39:07.407		36.68	-49.51	50026.71	-1.62		
delta	I	2031-02-28T22:56:44.577		33.44	-51.31	48300.35	-1.65		
gamma	I	2031-02-28T23:03:34.652		32.18	-51.92	47623.57	-1.66		
eta	I	2031-02-28T23:08:04.446		31.36	-52.30	47176.12	-1.66		
beta	I	2031-02-28T23:23:01.963		28.61	-53.39	45675.10	-1.68		
alpha	I	2031-02-28T23:32:41.550		26.85	-53.96	44695.80	-1.70		
4	I	2031-02-28T23:53:34.732		23.05	-54.77	42548.50	-1.73		
5	I	2031-02-28T23:56:20.183		22.55	-54.83	42264.78	-1.73		
6	I	2031-03-01T00:00:01.251		21.89	-54.90	41878.58	-1.74		
Uranus	I	2031-03-01T02:29:35.744		-3.18x	-43.72	25432.15		3.63	3.80
Uranus	E	2031-03-01T08:15:01.572		-20.27x	16.43x	25503.31		2.40	2.52
6	E	2031-03-01T10:19:08.722		-6.36x	33.52x	41803.47	2.19		
5	E	2031-03-01T10:22:27.154		-5.89x	33.86x	42237.46	2.19		
4	E	2031-03-01T10:25:15.622		-5.49x	34.14x	42607.69	2.19		
alpha	E	2031-03-01T10:41:34.907		-3.10x	35.65x	44749.03	2.18		
beta	E	2031-03-01T10:48:29.373		-2.06x	36.23x	45653.44	2.18		
eta	E	2031-03-01T11:00:08.861		-0.27x	37.11x	47176.12	2.17		
gamma	E	2031-03-01T11:03:36.509		0.27x	37.35x	47627.20	2.17		
delta	E	2031-03-01T11:08:46.767		1.08x	37.68x	48300.35	2.17		
lambda	E	2031-03-01T11:22:04.705		3.20x	38.43x	50026.71	2.16		
epsilon	E	2031-03-01T11:30:34.604		4.58x	38.83x	51125.98	2.15		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-03-01T04:36:18.690
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3415408747410005632
 2Mass ID (if available) : 05093215+2301564
 ICRS Star Coord at Epoch: 05h 09m 32.14296s +23:01:56.30520s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.674
 G magnitude : 18.469
 RP magnitude : 17.314
 BP magnitude : 19.955
 DUPflag : 0
 Distance (au) : 18.970
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.97
 Sun-Target sep (deg) : 98.42
 Sun-Moon sep (deg) : 7.33
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.612
 C/A sky separation (km) : 8424.7
 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



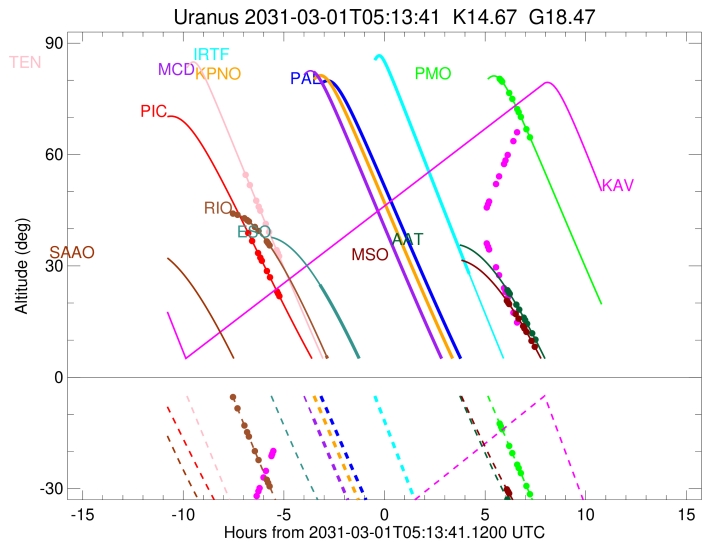
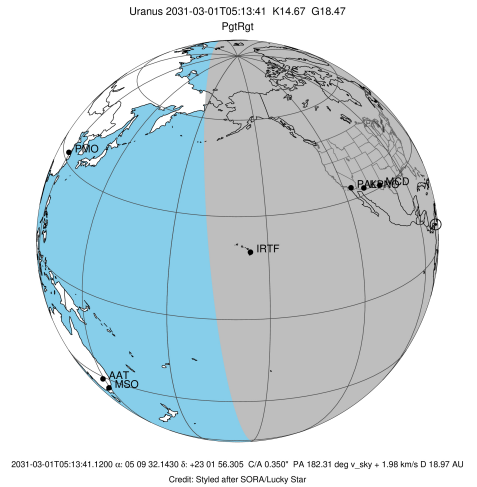
Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-28T22:06:28.388	-34.38x	-6.36	51016.92	-2.15		
lambda	I	2031-02-28T22:14:08.217	-34.64x	-4.74x	50026.71	-2.16		
delta	I	2031-02-28T22:27:28.192	-34.93x	-1.93x	48300.35	-2.16		
gamma	I	2031-02-28T22:32:41.418	-34.99x	-0.83x	47623.34	-2.16		
eta	I	2031-02-28T22:36:08.208	-35.02x	-0.11x	47176.12	-2.16		
beta	I	2031-02-28T22:47:41.401	-35.02x	2.31x	45675.81	-2.17		
alpha	I	2031-02-28T22:55:13.434	-34.95x	3.88x	44697.09	-2.17		
4	I	2031-02-28T23:11:43.334	-34.57x	7.30x	42550.47	-2.17		
5	I	2031-02-28T23:13:54.752	-34.50x	7.75x	42268.43	-2.17		
6	I	2031-02-28T23:16:52.947	-34.40x	8.36x	41879.02	-2.17		
Uranus	I	2031-03-01T01:25:07.073	-22.54x	32.97x	25418.80		3.82	4.00
Uranus	E	2031-03-01T08:13:29.439	56.43	21.23x	25547.33		1.10	1.15
6	E	2031-03-01T10:56:38.900	80.43	-12.37	41800.84	1.68		
5	E	2031-03-01T11:00:52.855	80.03	-13.27	42228.74	1.69		
4	E	2031-03-01T11:04:35.408	79.62	-14.05	42604.58	1.69		
alpha	E	2031-03-01T11:25:38.440	76.56	-18.52	44747.39	1.70		
beta	E	2031-03-01T11:34:27.874	75.03	-20.39	45651.67	1.71		
eta	E	2031-03-01T11:49:15.161	72.27	-23.51	47176.12	1.72		
gamma	E	2031-03-01T11:53:36.651	71.43	-24.43	47627.67	1.73		
delta	E	2031-03-01T12:00:05.008	70.16	-25.80	48300.35	1.74		
lambda	E	2031-03-01T12:16:34.951	66.84	-29.26	50026.71	1.75		
epsilon	E	2031-03-01T12:27:18.433	64.63	-31.49	51158.50	1.76		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-03-01T05:53:35.900
 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 : 3415408747410005632
 2Mass ID (if available) : 05093215+2301564
 ICRS Star Coord at Epoch: 05h 09m 32.14296s +23:01:56.30520s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.674
 G magnitude : 18.469
 RP magnitude : 17.314
 BP magnitude : 19.955
 DUPflag : 0
 Distance (au) : 18.971
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.97
 Sun-Target sep (deg) : 98.42
 Sun-Moon sep (deg) : 8.70
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.458
 C/A sky separation (km) : 6296.7
 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	2031-02-28T21:05:29.313		30.56	42.54x	51036.13	-1.66		
lambda	I	2031-02-28T21:15:38.159		32.72	41.07x	50026.71	-1.65		
delta	I	2031-02-28T21:33:10.463		36.47	38.36x	48300.35	-1.63		
gamma	I	2031-02-28T21:40:06.760		37.96	37.23x	47623.63	-1.62		
eta	I	2031-02-28T21:44:43.224		38.94	36.46x	47176.12	-1.62		
beta	I	2031-02-28T22:00:17.552		42.29	33.80x	45674.82	-1.60		
alpha	I	2031-02-28T22:10:32.974		44.50	31.99x	44695.20	-1.59		
4	I	2031-02-28T22:33:16.191		49.41	27.81x	42547.19	-1.56		
5	I	2031-02-28T22:36:20.119		50.07	27.23x	42262.14	-1.56		
6	I	2031-02-28T22:40:24.886		50.95	26.46x	41878.19	-1.56		
Uranus	I	2031-03-01T01:42:04.306		82.28	-11.11	25495.55		2.56	2.69
Uranus	E	2031-03-01T09:17:17.881		-8.86x	-52.16	25533.17		1.63	1.71
6	E	2031-03-01T11:15:43.766		-27.34x	-28.04	41802.83	2.39		
5	E	2031-03-01T11:18:44.835		-27.71x	-27.40	42235.54	2.40		
4	E	2031-03-01T11:21:19.348		-28.03x	-26.85	42607.07	2.40		
alpha	E	2031-03-01T11:36:07.861		-29.74x	-23.68	44748.77	2.42		
beta	E	2031-03-01T11:42:20.701		-30.41x	-22.34	45653.17	2.43		
eta	E	2031-03-01T11:52:45.832		-31.46x	-20.10	47176.12	2.44		
gamma	E	2031-03-01T11:55:50.384		-31.76x	-19.44	47627.25	2.45		
delta	E	2031-03-01T12:00:25.224		-32.18x	-18.45	48300.35	2.45		
lambda	E	2031-03-01T12:12:07.473		-33.18x	-15.93	50026.71	2.46		
epsilon	E	2031-03-01T12:19:33.179		-33.75x	-14.33	51127.01	2.47		

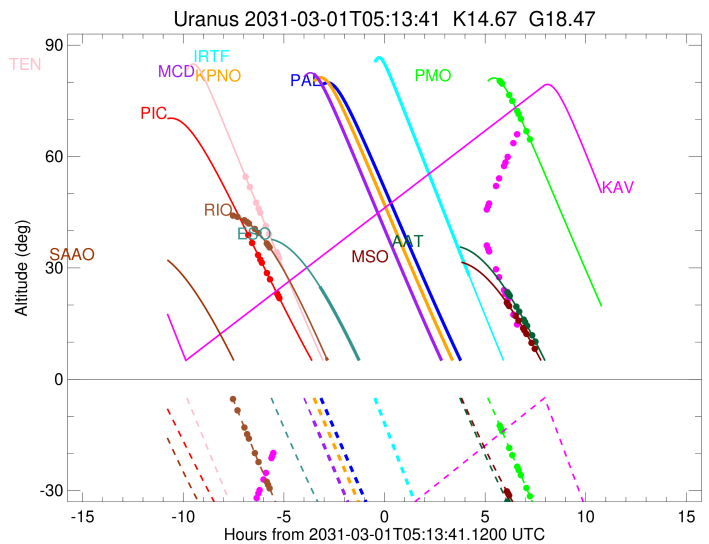
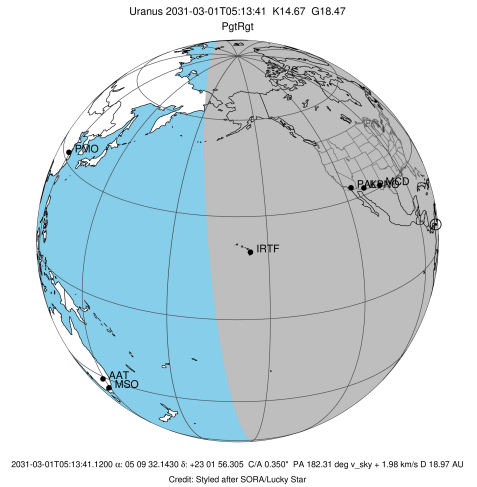
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-03-01T05:38:04.140
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3415408747410005632
 2Mass ID (if available) : 05093215+2301564
 ICRS Star Coord at Epoch: 05h 09m 32.14296s +23:01:56.30520s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.674
 G magnitude : 18.469
 RP magnitude : 17.314
 BP magnitude : 19.955
 DUPflag : 0
 Distance (au) : 18.971
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.97
 Sun-Target sep (deg) : 98.42
 Sun-Moon sep (deg) : 8.48
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.659
 C/A sky separation (km) : 9068.3
 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	2031-02-28T22:20:51.398		54.26	-43.48	51050.96	-1.48		
lambda	I	2031-02-28T22:32:18.100		51.73	-45.87	50026.71	-1.50		
delta	I	2031-02-28T22:51:19.650		47.53	-49.78	48300.35	-1.53		
gamma	I	2031-02-28T22:58:41.558		45.91	-51.26	47623.76	-1.54		
eta	I	2031-02-28T23:03:32.232		44.84	-52.22	47176.12	-1.54		
beta	I	2031-02-28T23:19:37.506		41.30	-55.35	45674.47	-1.57		
alpha	I	2031-02-28T23:29:59.318		39.03	-57.29	44694.71	-1.58		
4	I	2031-02-28T23:52:19.241		34.16	-61.21	42546.71	-1.62		
5	I	2031-02-28T23:55:16.433		33.51	-61.70	42261.27	-1.63		
6	I	2031-02-28T23:59:10.275		32.67	-62.33	41878.07	-1.63		
Uranus	I	2031-03-01T02:34:31.436	0.13x	-62.79	25465.01			3.12	3.27
Uranus	E	2031-03-01T08:24:51.158	-37.75x	10.81x	25514.60			2.14	2.24
6	E	2031-03-01T10:21:52.730	-25.81x	34.43x	41803.11	2.33			
5	E	2031-03-01T10:24:59.438	-25.35x	35.00x	42236.33	2.33			
4	E	2031-03-01T10:27:38.631	-24.96x	35.49x	42607.31	2.32			
alpha	E	2031-03-01T10:43:01.681	-22.61x	38.23x	44748.84	2.32			
beta	E	2031-03-01T10:49:32.219	-21.57x	39.36x	45653.22	2.31			
eta	E	2031-03-01T11:00:31.328	-19.79x	41.20x	47176.12	2.31			
gamma	E	2031-03-01T11:03:46.962	-19.24x	41.74x	47627.26	2.30			
delta	E	2031-03-01T11:08:39.188	-18.43x	42.52x	48300.35	2.30			
lambda	E	2031-03-01T11:21:10.743	-16.28x	44.46x	50026.71	2.29			
epsilon	E	2031-03-01T11:29:12.723	-14.88x	45.64x	51129.99	2.28			

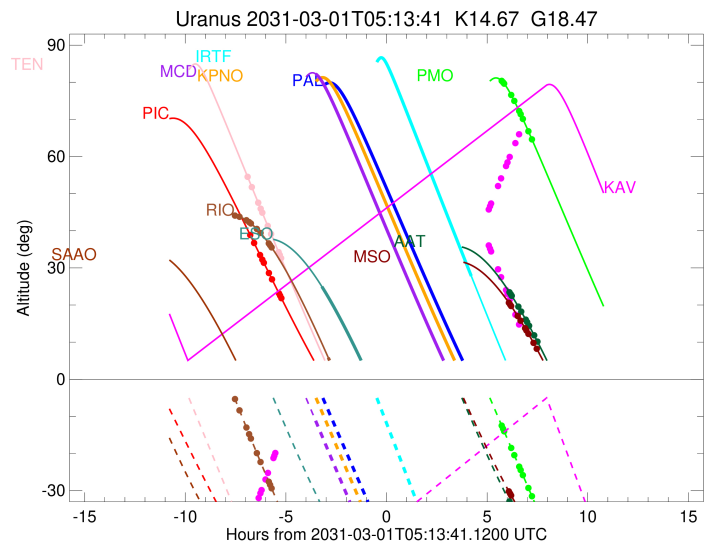
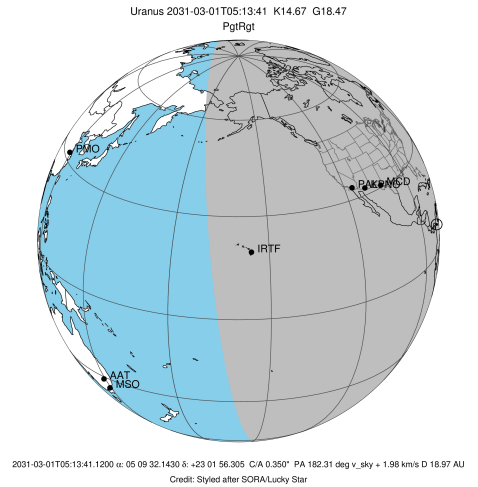
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-03-01T05:18:34.950
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      : 3415408747410005632
2Mass ID (if available) : 05093215+2301564
ICRS Star Coord at Epoch: 05h 09m 32.14296s +23:01:56.30520s
RUWE (>1.4 is poor) : 0.99
K magnitude         : 14.674
G magnitude         : 18.469
RP magnitude        : 17.314
BP magnitude        : 19.955
DUPflag            : 0
Distance (au)       : 18.971
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : 1.97
Sun-Target sep (deg) : 98.42
Sun-Moon sep (deg)  : 8.11
B (ring opening deg) : 82.14
PA of pole (deg)    : 0.51
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.313
C/A sky separation (km) : 4305.1
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



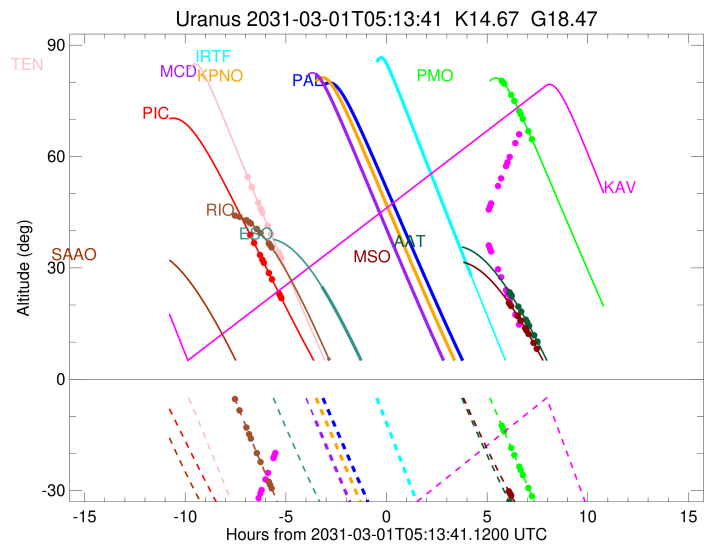
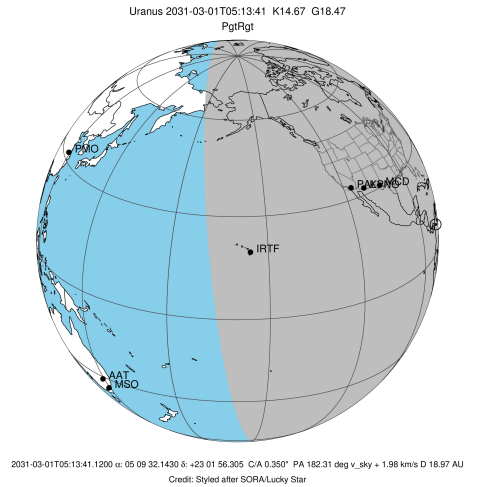
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-28T21:05:50.178	-16.23x	54.92x	51028.52	-2.01			
lambda	I	2031-02-28T21:14:08.468	-14.57x	56.16x	50026.71	-2.01			
delta	I	2031-02-28T21:28:33.362	-11.65x	58.10x	48300.35	-1.99			
gamma	I	2031-02-28T21:34:14.699	-10.48x	58.79x	47623.52	-1.98			
eta	I	2031-02-28T21:38:01.055	-9.70x	59.22x	47176.12	-1.97			
beta	I	2031-02-28T21:50:44.843	-7.06x	60.50x	45675.18	-1.96			
alpha	I	2031-02-28T21:59:07.119	-5.30x	61.19x	44695.84	-1.94			
4	I	2031-02-28T22:17:38.400	-1.37x	62.22x	42548.24	-1.92			
5	I	2031-02-28T22:20:07.885	-0.84x	62.31x	42264.21	-1.91			
6	I	2031-02-28T22:23:28.177	-0.12x	62.40x	41878.49	-1.91			
Uranus	I	2031-03-01T00:55:21.869	33.65	45.76x	25486.92		2.73	2.86	
Uranus	E	2031-03-01T09:26:30.582	27.80	-69.60	25554.02		0.72	0.75	
6	E	2031-03-01T11:40:08.795	-1.73x	-69.93	41801.28	2.18			
5	E	2031-03-01T11:43:25.712	-2.43x	-69.29	42230.39	2.18			
4	E	2031-03-01T11:46:16.877	-3.03x	-68.73	42605.23	2.19			
alpha	E	2031-03-01T12:02:26.803	-6.45x	-65.41	44747.82	2.23			
beta	E	2031-03-01T12:09:11.443	-7.86x	-63.98	45652.14	2.24			
eta	E	2031-03-01T12:20:27.393	-10.19x	-61.54	47176.12	2.27			
gamma	E	2031-03-01T12:23:46.215	-10.87x	-60.81	47627.53	2.27			
delta	E	2031-03-01T12:28:41.406	-11.88x	-59.72	48300.35	2.28			
lambda	E	2031-03-01T12:41:12.693	-14.42x	-56.92	50026.71	2.31			
epsilon	E	2031-03-01T12:49:15.185	-16.03x	-55.11	51145.84	2.33			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-03-01T05:50:55.030
 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 : 3415408747410005632
 2Mass ID (if available) : 05093215+2301564
 ICRS Star Coord at Epoch: 05h 09m 32.14296s +23:01:56.30520s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.674
 G magnitude : 18.469
 RP magnitude : 17.314
 BP magnitude : 19.955
 DUPflag : 0
 Distance (au) : 18.971
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.97
 Sun-Target sep (deg) : 98.42
 Sun-Moon sep (deg) : 8.56
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.241
 C/A sky separation (km) : 3316.1
 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



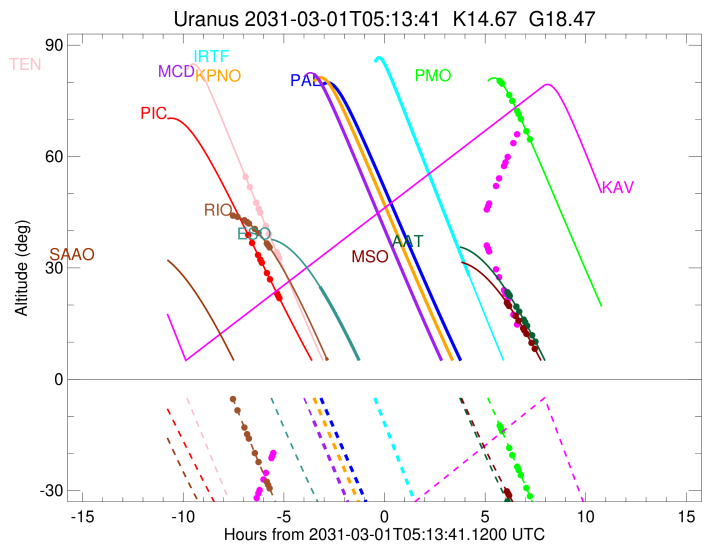
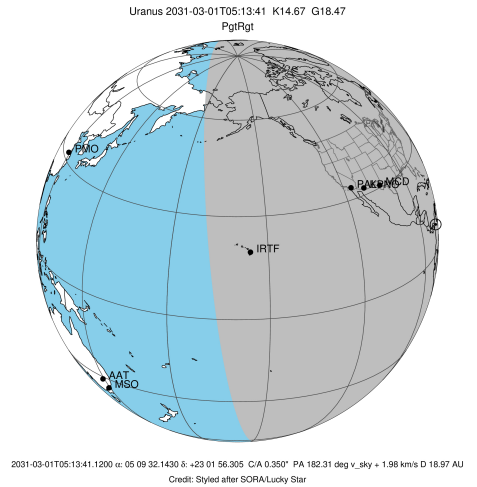
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-28T21:42:47.252		44.07	-5.53	51092.70	-1.39		
lambda	I	2031-02-28T21:55:35.125		43.76	-8.42	50026.71	-1.39		
delta	I	2031-02-28T22:16:11.182		42.83	-13.04	48300.35	-1.40		
gamma	I	2031-02-28T22:24:12.162		42.32	-14.83	47624.33	-1.41		
eta	I	2031-02-28T22:29:29.991		41.95	-16.01	47176.12	-1.41		
beta	I	2031-02-28T22:47:09.442		40.49	-19.91	45672.48	-1.43		
alpha	I	2031-02-28T22:58:34.331		39.37	-22.40	44691.80	-1.44		
4	I	2031-02-28T23:23:16.269		36.53	-27.72	42541.68	-1.46		
5	I	2031-02-28T23:26:35.622		36.11	-28.43	42250.44	-1.47		
6	I	2031-02-28T23:30:49.489		35.56	-29.32	41875.99	-1.47		
Uranus	I	2031-03-01T02:20:06.713		5.82	-57.59	25543.50		1.27	1.33
Uranus	E	2031-03-01T08:49:53.493		-81.12x	-0.58x	25556.28		0.53	0.55
6	E	2031-03-01T10:39:16.786		-73.62x	24.55x	41800.42	2.48		
5	E	2031-03-01T10:42:08.646		-72.96x	25.21x	42227.19	2.48		
4	E	2031-03-01T10:44:40.406		-72.38x	25.80x	42603.99	2.48		
alpha	E	2031-03-01T10:59:04.009		-69.06x	29.11x	44747.06	2.48		
beta	E	2031-03-01T11:05:08.763		-67.67x	30.50x	45651.36	2.48		
eta	E	2031-03-01T11:15:24.407		-65.31x	32.86x	47176.12	2.47		
gamma	E	2031-03-01T11:18:26.940		-64.61x	33.56x	47627.76	2.47		
delta	E	2031-03-01T11:22:58.935		-63.56x	34.60x	48300.35	2.47		
lambda	E	2031-03-01T11:34:38.110		-60.89x	37.26x	50026.71	2.47		
epsilon	E	2031-03-01T11:42:20.462		-59.12x	39.02x	51166.04	2.46		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-03-01T05:56:23.700
 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 : 3415408747410005632
 2Mass ID (if available) : 05093215+2301564
 ICRS Star Coord at Epoch: 05h 09m 32.14296s +23:01:56.30520s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.674
 G magnitude : 18.469
 RP magnitude : 17.314
 BP magnitude : 19.955
 DUPflag : 0
 Distance (au) : 18.971
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.97
 Sun-Target sep (deg) : 98.42
 Sun-Moon sep (deg) : 8.62
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.122
 C/A sky separation (km) : 1682.3
 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



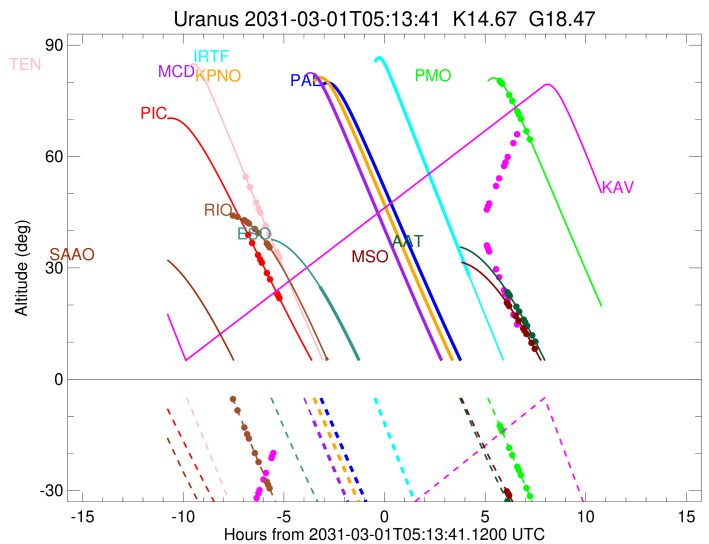
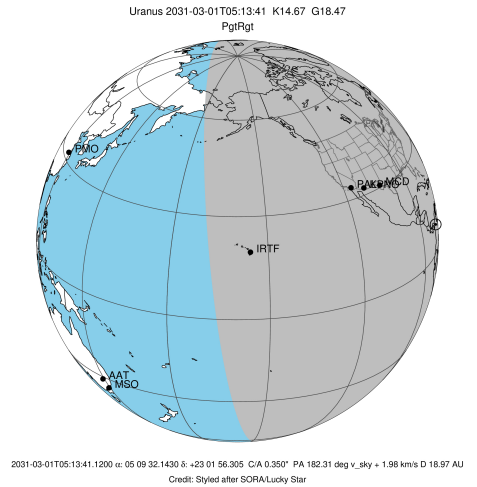
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-28T21:12:43.007		29.46	26.16x	51091.28	-1.47		
lambda	I	2031-02-28T21:24:50.058		30.89	23.52x	50026.71	-1.46		
delta	I	2031-02-28T21:44:36.311		32.98	19.20x	48300.35	-1.45		
gamma	I	2031-02-28T21:52:22.898		33.71	17.50x	47624.33	-1.45		
eta	I	2031-02-28T21:57:32.797		34.17	16.37x	47176.12	-1.45		
beta	I	2031-02-28T22:14:55.085		35.52	12.58x	45672.42	-1.44		
alpha	I	2031-02-28T22:26:16.551		36.25	10.10x	44691.68	-1.44		
4	I	2031-02-28T22:51:11.981		37.37	4.67x	42541.36	-1.44		
5	I	2031-02-28T22:54:35.564		37.47	3.93x	42249.65	-1.44		
6	I	2031-02-28T22:58:54.845		37.59	2.99x	41875.80	-1.44		
Uranus	I	2031-03-01T02:00:58.937		24.97	-34.19	25551.90		0.86	0.90
Uranus	E	2031-03-01T09:07:04.803		-60.00x	-19.25	25558.78		0.15	0.16
6	E	2031-03-01T10:57:38.623		-82.42x	4.18x	41799.98	2.49		
5	E	2031-03-01T11:00:29.311		-82.79x	4.80x	42225.57	2.49		
4	E	2031-03-01T11:03:00.874		-83.09x	5.35x	42603.36	2.49		
alpha	E	2031-03-01T11:17:18.849		-83.97x	8.46x	44746.74	2.50		
beta	E	2031-03-01T11:23:20.218		-83.86x	9.77x	45651.07	2.50		
eta	E	2031-03-01T11:33:28.889		-83.04x	11.98x	47176.12	2.51		
gamma	E	2031-03-01T11:36:29.026		-82.68x	12.64x	47627.84	2.51		
delta	E	2031-03-01T11:40:57.101		-82.07x	13.61x	48300.35	2.51		
lambda	E	2031-03-01T11:52:24.773		-80.20x	16.12x	50026.71	2.51		
epsilon	E	2031-03-01T12:00:00.231		-78.80x	17.77x	51170.82	2.51		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-03-01T04:30:19.510
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3415408747410005632
 2Mass ID (if available) : 05093215+2301564
 ICRS Star Coord at Epoch: 05h 09m 32.14296s +23:01:56.30520s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.674
 G magnitude : 18.469
 RP magnitude : 17.314
 BP magnitude : 19.955
 DUPflag : 0
 Distance (au) : 18.970
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.97
 Sun-Target sep (deg) : 98.42
 Sun-Moon sep (deg) : 7.27
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.089
 C/A sky separation (km) : 1223.4
 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	2031-02-28T21:33:40.428	-75.82x	20.56x	51063.04	-2.19			
lambda	I	2031-02-28T21:41:33.392	-74.35x	22.25x	50026.71	-2.19			
delta	I	2031-02-28T21:54:41.349	-71.78x	25.04x	48300.35	-2.19			
gamma	I	2031-02-28T21:59:50.187	-70.75x	26.14x	47623.94	-2.19			
eta	I	2031-02-28T22:03:14.707	-70.06x	26.86x	47176.12	-2.19			
beta	I	2031-02-28T22:14:41.267	-67.71x	29.28x	45673.82	-2.19			
alpha	I	2031-02-28T22:22:09.761	-66.15x	30.86x	44693.64	-2.19			
4	I	2031-02-28T22:38:33.999	-62.71x	34.30x	42544.74	-2.18			
5	I	2031-02-28T22:40:46.774	-62.24x	34.76x	42257.17	-2.18			
6	I	2031-02-28T22:43:40.286	-61.63x	35.36x	41877.36	-2.18			
Uranus	I	2031-03-01T00:51:08.556	-34.36x	59.33x	25525.41			1.86	1.95
Uranus	E	2031-03-01T08:41:24.073	35.82	-1.44x	25548.87			-1.02	-1.07
6	E	2031-03-01T11:19:46.504	23.51	-32.81	41798.06	1.79			
5	E	2031-03-01T11:23:39.585	22.97	-33.49	42217.45	1.80			
4	E	2031-03-01T11:27:12.669	22.46	-34.10	42599.94	1.80			
alpha	E	2031-03-01T11:46:52.483	19.55	-37.39	44744.81	1.83			
beta	E	2031-03-01T11:55:04.421	18.27	-38.70	45649.50	1.85			
eta	E	2031-03-01T12:08:46.392	16.08	-40.79	47176.12	1.87			
gamma	E	2031-03-01T12:12:47.891	15.42	-41.38	47628.28	1.88			
delta	E	2031-03-01T12:18:45.201	14.43	-42.23	48300.35	1.89			
lambda	E	2031-03-01T12:33:54.019	11.86	-44.27	50026.71	1.91			
epsilon	E	2031-03-01T12:44:05.548	10.08	-45.53	51202.41	1.93			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-03-01T04:31:43.900
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3415408747410005632
 2Mass ID (if available) : 05093215+2301564
 ICRS Star Coord at Epoch: 05h 09m 32.14296s +23:01:56.30520s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.674
 G magnitude : 18.469
 RP magnitude : 17.314
 BP magnitude : 19.955
 DUPflag : 0
 Distance (au) : 18.970
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.97
 Sun-Target sep (deg) : 98.42
 Sun-Moon sep (deg) : 7.29
 B (ring opening deg) : 82.14
 PA of pole (deg) : 0.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.065
 C/A sky separation (km) : 890.7
 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	2031-02-28T21:33:30.617	-73.43x	20.20x	51066.52	-2.17		
lambda	I	2031-02-28T21:41:28.651	-72.20x	21.82x	50026.71	-2.18		
delta	I	2031-02-28T21:54:42.320	-69.99x	24.50x	48300.35	-2.17		
gamma	I	2031-02-28T21:59:53.348	-69.08x	25.55x	47623.98	-2.17		
eta	I	2031-02-28T22:03:19.344	-68.46x	26.24x	47176.12	-2.17		
beta	I	2031-02-28T22:14:50.805	-66.35x	28.56x	45673.66	-2.17		
alpha	I	2031-02-28T22:22:22.436	-64.93x	30.06x	44693.41	-2.17		
4	I	2031-02-28T22:38:53.443	-61.74x	33.34x	42544.36	-2.16		
5	I	2031-02-28T22:41:07.265	-61.30x	33.78x	42256.36	-2.16		
6	I	2031-02-28T22:44:01.668	-60.73x	34.35x	41877.21	-2.16		
Uranus	I	2031-03-01T00:52:10.159	-34.68x	56.47x	25529.75		1.74	1.82
Uranus	E	2031-03-01T08:41:00.414	31.79	-0.63x	25547.34		-1.10	-1.15
6	E	2031-03-01T11:17:59.481	20.68	-30.11	41797.96	1.80		
5	E	2031-03-01T11:21:50.922	20.18	-30.74	42216.96	1.81		
4	E	2031-03-01T11:25:22.943	19.71	-31.32	42599.73	1.81		
alpha	E	2031-03-01T11:44:56.528	17.01	-34.37	44744.68	1.84		
beta	E	2031-03-01T11:53:06.185	15.83	-35.58	45649.40	1.85		
eta	E	2031-03-01T12:06:44.767	13.78	-37.51	47176.12	1.88		
gamma	E	2031-03-01T12:10:45.367	13.17	-38.06	47628.30	1.88		
delta	E	2031-03-01T12:16:41.390	12.24	-38.84	48300.35	1.89		
lambda	E	2031-03-01T12:31:47.406	9.83	-40.72	50026.71	1.92		
epsilon	E	2031-03-01T12:41:58.580	8.15	-41.87	51204.70	1.94		