

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-05T23:25:28.510
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3415398125956056832
 2Mass ID (if available) : 05101360+2302401

Uranus 2031-02-05T23:25:28 K13.44 G16.82 PgtRgt

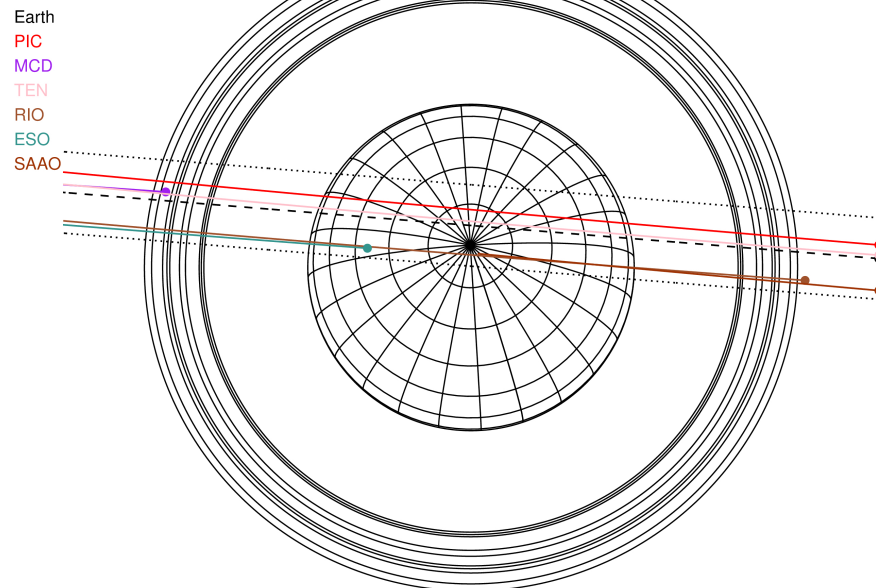
ICRS Star Coord at Epoch: 05h 10m 13.61374s +23:02:39.87763s

RUWE (>1.4 is poor) : 0.99
 K magnitude : 13.438
 G magnitude : 16.821
 RP magnitude : 15.819
 BP magnitude : 17.792
 DUPflag : 0
 Distance (au) : 18.604
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.47
 Sun-Target sep (deg) : 122.03
 Sun-Moon sep (deg) : 40.61
 B (ring opening deg) : 82.13
 PA of pole (deg) : 1.73

Uranus 2031-02-05T23:25:28 K13.44 G16.82
 PgtRgt



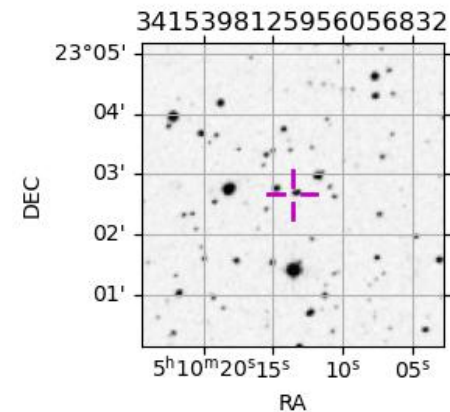
2031-02-05T23:25:28.5100 α: 05 10 13.6137 s: +23 02 39.878 C/A 0.492" PA 175.36 deg v_sky - 9.47 km/s D 18.60 AU
 Credit: Styled after SORA/Lucky Star



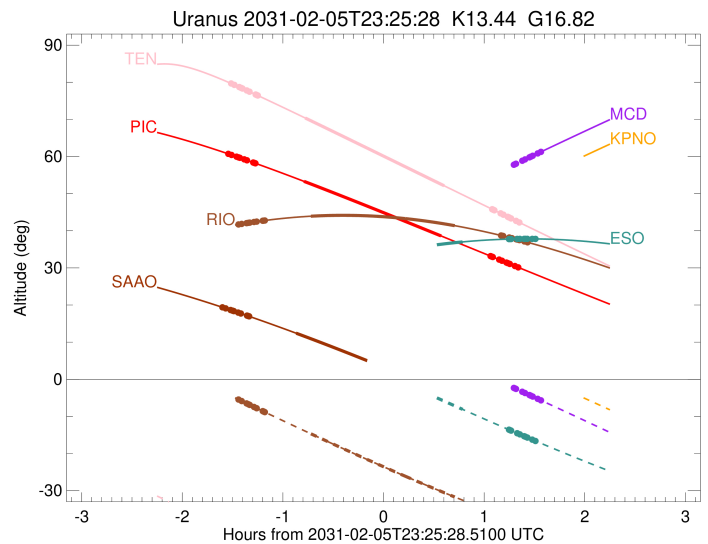
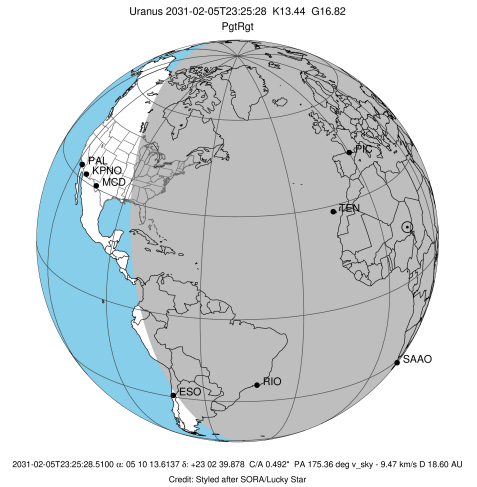
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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 05 21:53 - FEB 06 00:45	PieRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0			++	FEB 06 00:57 - FEB 06 00:59	PnnRne
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+ +	+++++	FEB 05 21:55 - FEB 06 00:46	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	FEB 05 21:59 - FEB 06 00:51	PieRie
ESO	European Southern Obs	-29.3	289.3		+	+++++	FEB 06 00:12 - FEB 06 00:56	PneRne
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++	+		FEB 05 21:49 - FEB 05 22:33	PinRin
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

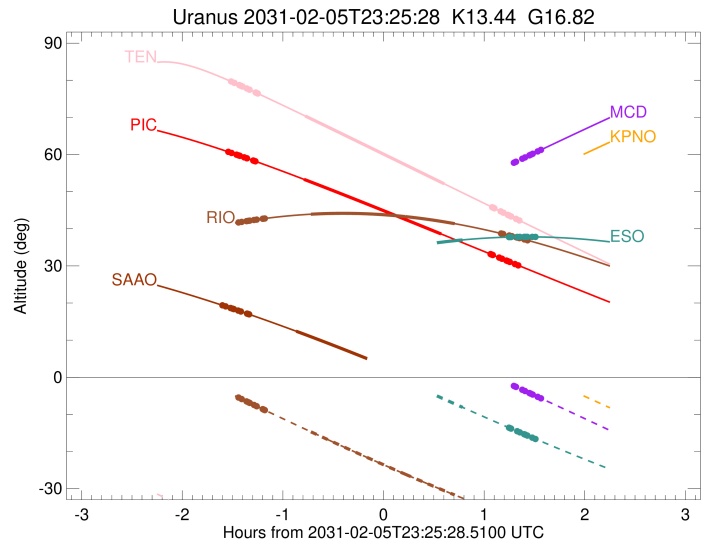
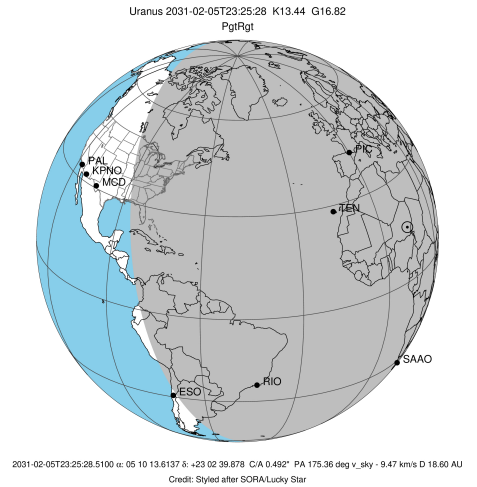


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-05T23:18:53.310
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3415398125956056832
 2Mass ID (if available) : 05101360+2302401
 ICRS Star Coord at Epoch: 05h 10m 13.61374s +23:02:39.87763s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 13.438
 G magnitude : 16.821
 RP magnitude : 15.819
 BP magnitude : 17.792
 DUPflag : 0
 Distance (au) : 18.604
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.47
 Sun-Target sep (deg) : 122.03
 Sun-Moon sep (deg) : 40.65
 B (ring opening deg) : 82.13
 PA of pole (deg) : 1.73
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.669
 C/A sky separation (km) : 9025.1
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



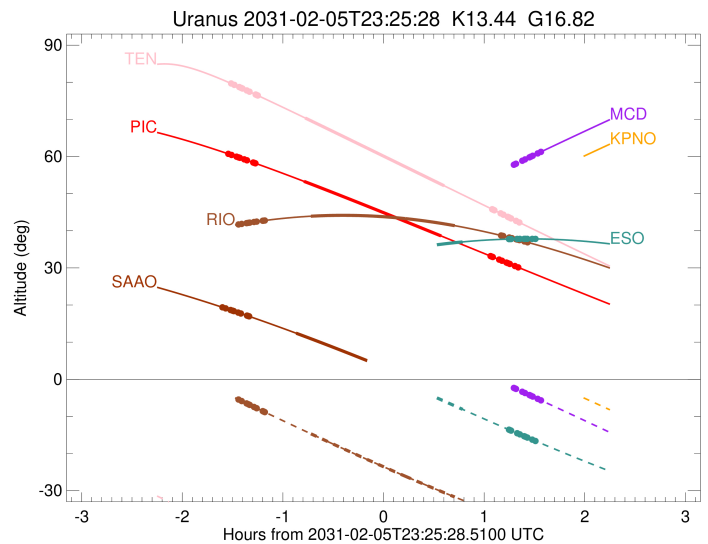
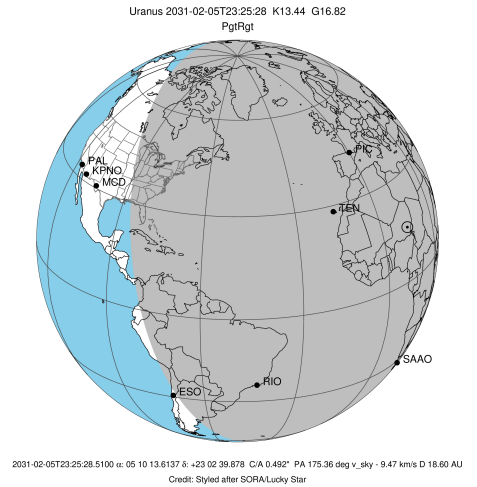
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-05T21:53:21.822		60.66	-49.76	50912.74	-9.64		
lambda	I	2031-02-05T21:54:53.690		60.42	-50.00	50026.71	-9.64		
delta	I	2031-02-05T21:57:52.892		59.96	-50.46	48300.35	-9.63		
gamma	I	2031-02-05T21:59:03.227		59.78	-50.64	47623.53	-9.62		
eta	I	2031-02-05T21:59:49.747		59.65	-50.76	47176.12	-9.62		
beta	I	2031-02-05T22:02:26.540		59.24	-51.16	45669.65	-9.60		
alpha	I	2031-02-05T22:04:02.458		58.99	-51.40	44749.18	-9.59		
4	I	2031-02-05T22:07:45.567		58.39	-51.96	42612.59	-9.56		
5	I	2031-02-05T22:08:17.464		58.31	-52.04	42307.17	-9.56		
6	I	2031-02-05T22:09:05.816		58.18	-52.16	41845.87	-9.56		
Uranus	I	2031-02-05T22:38:00.787		53.33	-56.18	25524.64		1.89	1.98
Uranus	E	2031-02-05T23:59:49.867		38.61	-62.84	25431.50		3.65	3.82
6	E	2031-02-06T00:29:18.814		33.18	-62.78	41847.39	9.37		
5	E	2031-02-06T00:29:54.630		33.07	-62.76	42184.76	9.37		
4	E	2031-02-06T00:30:31.048		32.96	-62.74	42525.94	9.37		
alpha	E	2031-02-06T00:34:21.096		32.25	-62.62	44684.62	9.39		
beta	E	2031-02-06T00:36:05.043		31.93	-62.56	45660.57	9.40		
eta	E	2031-02-06T00:38:46.286		31.44	-62.45	47176.12	9.40		
gamma	E	2031-02-06T00:39:34.238		31.29	-62.41	47627.06	9.40		
delta	E	2031-02-06T00:40:45.814		31.07	-62.36	48300.35	9.41		
lambda	E	2031-02-06T00:43:49.241		30.51	-62.21	50026.71	9.42		
epsilon	E	2031-02-06T00:45:58.807		30.12	-62.10	51246.85	9.41		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-05T23:33:09.250
 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 : 3415398125956056832
 2Mass ID (if available) : 05101360+2302401
 ICRS Star Coord at Epoch: 05h 10m 13.61374s +23:02:39.87763s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 13.438
 G magnitude : 16.821
 RP magnitude : 15.819
 BP magnitude : 17.792
 DUPflag : 0
 Distance (au) : 18.604
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.47
 Sun-Target sep (deg) : 122.03
 Sun-Moon sep (deg) : 41.49
 B (ring opening deg) : 82.13
 PA of pole (deg) : 1.73
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.635
 C/A sky separation (km) : 8568.7
 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_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	2031-02-05T22:06:27.896		24.20	27.23x	50908.58	-9.44		
lambda	I	2031-02-05T22:08:01.272		24.52	26.98x	50026.71	-9.44		
delta	I	2031-02-05T22:11:04.156		25.16	26.48x	48300.35	-9.44		
gamma	I	2031-02-05T22:12:15.899		25.42	26.28x	47623.47	-9.43		
eta	I	2031-02-05T22:13:03.327		25.58	26.15x	47176.12	-9.43		
beta	I	2031-02-05T22:15:43.097		26.14	25.71x	45669.86	-9.42		
alpha	I	2031-02-05T22:17:20.827		26.49	25.44x	44749.01	-9.42		
4	I	2031-02-05T22:21:07.884		27.29	24.80x	42612.38	-9.40		
5	I	2031-02-05T22:21:40.255		27.40	24.71x	42307.55	-9.40		
6	I	2031-02-05T22:22:29.421		27.57	24.57x	41846.31	-9.40		
Uranus	I	2031-02-05T22:51:43.936		33.79	19.44x	25523.63		1.92	2.01
Uranus	E	2031-02-06T00:14:14.873		51.54	3.57x	25451.53		3.35	3.51
6	E	2031-02-06T00:43:11.922		57.79	-2.33x	41845.96	9.55		
5	E	2031-02-06T00:43:46.990		57.91	-2.45x	42182.65	9.56		
4	E	2031-02-06T00:44:22.936		58.04	-2.57x	42525.94	9.56		
alpha	E	2031-02-06T00:48:08.462		58.85	-3.35x	44684.67	9.58		
beta	E	2031-02-06T00:49:50.233		59.21	-3.70x	45659.90	9.59		
eta	E	2031-02-06T00:52:28.225		59.78	-4.24x	47176.12	9.60		
gamma	E	2031-02-06T00:53:15.192		59.95	-4.41x	47627.23	9.61		
delta	E	2031-02-06T00:54:25.237		60.20	-4.65x	48300.35	9.61		
lambda	E	2031-02-06T00:57:24.711		60.84	-5.27	50026.71	9.63		
epsilon	E	2031-02-06T00:59:32.745		61.30	-5.71	51259.65	9.62		

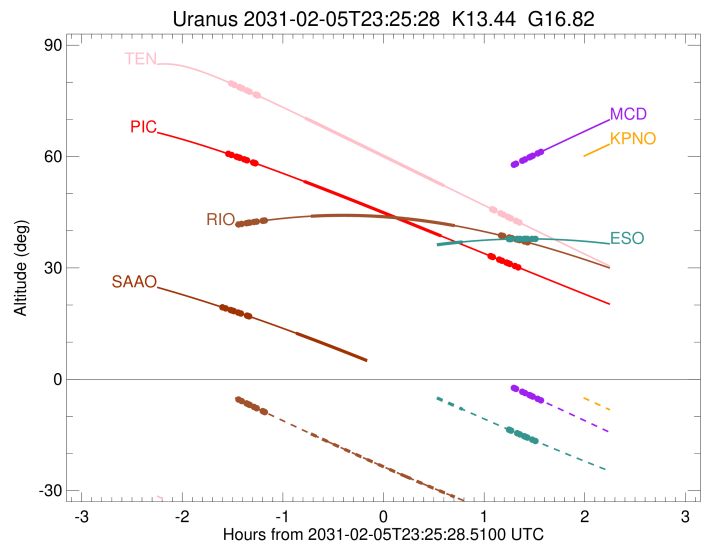
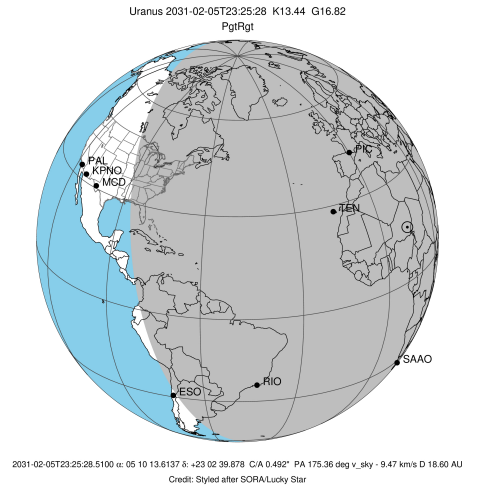
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-05T23:20:08.170
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3415398125956056832
 2Mass ID (if available) : 05101360+2302401
 ICRS Star Coord at Epoch: 05h 10m 13.61374s +23:02:39.87763s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 13.438
 G magnitude : 16.821
 RP magnitude : 15.819
 BP magnitude : 17.792
 DUPflag : 0
 Distance (au) : 18.604
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.47
 Sun-Target sep (deg) : 122.03
 Sun-Moon sep (deg) : 40.80
 B (ring opening deg) : 82.13
 PA of pole (deg) : 1.73
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.534
 C/A sky separation (km) : 7211.5
 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	2031-02-05T21:55:01.935		79.60	-41.27	50923.75	-9.79		
lambda	I	2031-02-05T21:56:33.498		79.30	-41.60	50026.71	-9.79		
delta	I	2031-02-05T21:59:29.840		78.71	-42.25	48300.35	-9.78		
gamma	I	2031-02-05T22:00:39.008		78.48	-42.50	47623.69	-9.78		
eta	I	2031-02-05T22:01:24.774		78.32	-42.67	47176.12	-9.78		
beta	I	2031-02-05T22:03:58.985		77.79	-43.23	45668.96	-9.77		
alpha	I	2031-02-05T22:05:33.114		77.47	-43.58	44749.72	-9.76		
4	I	2031-02-05T22:09:12.162		76.71	-44.38	42613.31	-9.74		
5	I	2031-02-05T22:09:43.712		76.60	-44.49	42305.67	-9.74		
6	I	2031-02-05T22:10:31.143		76.44	-44.67	41844.14	-9.74		
Uranus	I	2031-02-05T22:38:40.519		70.40	-50.82	25541.84		1.33	1.40
Uranus	E	2031-02-06T00:01:40.411		52.12	-68.07	25466.96		3.10	3.24
6	E	2031-02-06T00:30:17.997		45.80	-73.10	41845.46	9.58		
5	E	2031-02-06T00:30:52.956		45.67	-73.19	42181.94	9.58		
4	E	2031-02-06T00:31:28.895		45.54	-73.29	42525.95	9.58		
alpha	E	2031-02-06T00:35:14.095		44.72	-73.85	44684.69	9.59		
beta	E	2031-02-06T00:36:55.807		44.34	-74.10	45659.72	9.59		
eta	E	2031-02-06T00:39:33.890		43.76	-74.48	47176.12	9.59		
gamma	E	2031-02-06T00:40:20.911		43.59	-74.58	47627.27	9.59		
delta	E	2031-02-06T00:41:31.054		43.33	-74.74	48300.35	9.60		
lambda	E	2031-02-06T00:44:30.923		42.68	-75.13	50026.71	9.60		
epsilon	E	2031-02-06T00:46:39.576		42.20	-75.40	51261.78	9.59		

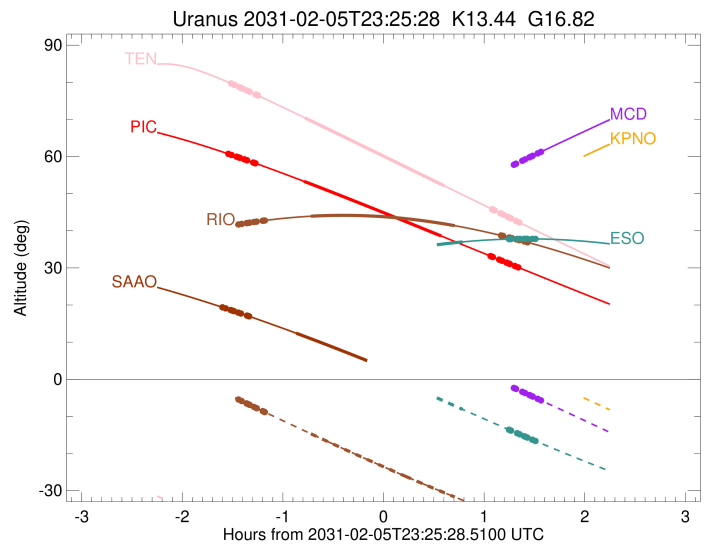
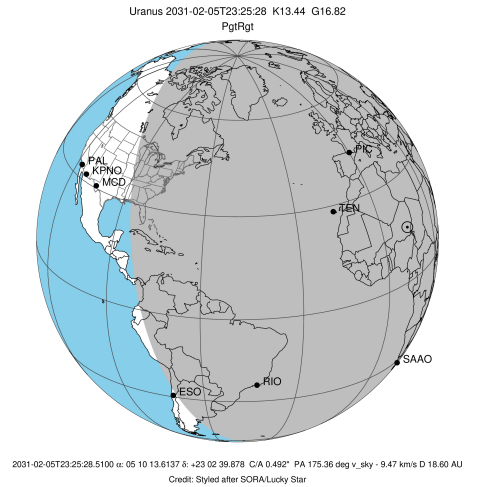
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-02-05T23:25:02.320
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       : 3415398125956056832
2Mass ID (if available) : 05101360+2302401
ICRS Star Coord at Epoch: 05h 10m 13.61374s +23:02:39.87763s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 13.438
G magnitude          : 16.821
RP magnitude         : 15.819
BP magnitude         : 17.792
DUPflag             : 0
Distance (au)        : 18.604
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -9.47
Sun-Target sep (deg) : 122.03
Sun-Moon sep (deg)   : 40.94
B (ring opening deg) : 82.13
PA of pole (deg)     : 1.73
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.145
C/A sky separation (km) : 1962.7
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_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



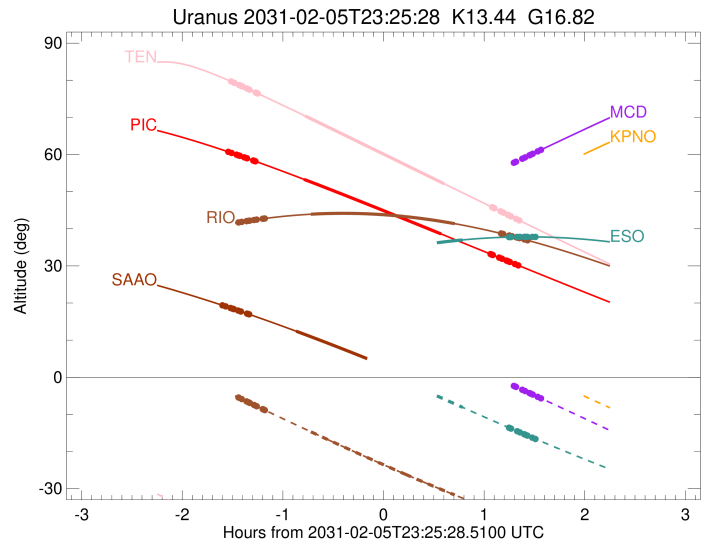
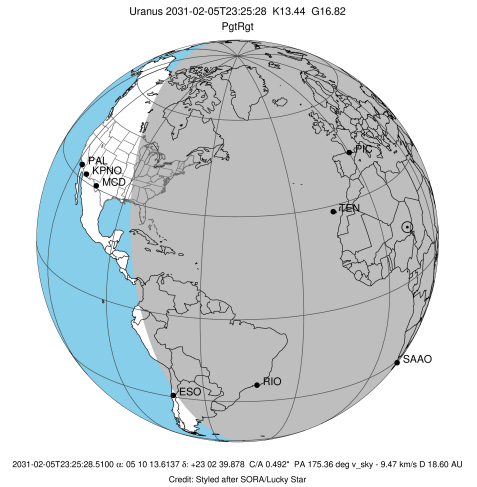
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-05T21:59:21.963		41.73	-5.53	50957.39	-9.89		
lambda	I	2031-02-05T22:00:56.041		41.85	-5.88	50026.71	-9.89		
delta	I	2031-02-05T22:03:50.550		42.06	-6.51	48300.35	-9.89		
gamma	I	2031-02-05T22:04:58.900		42.14	-6.75	47624.19	-9.89		
eta	I	2031-02-05T22:05:44.194		42.20	-6.92	47176.12	-9.89		
beta	I	2031-02-05T22:08:16.761		42.37	-7.46	45666.89	-9.89		
alpha	I	2031-02-05T22:09:49.357		42.47	-7.80	44751.00	-9.89		
4	I	2031-02-05T22:13:25.284		42.69	-8.57	42615.00	-9.89		
5	I	2031-02-05T22:13:57.082		42.72	-8.69	42300.66	-9.89		
6	I	2031-02-05T22:14:43.709		42.77	-8.85	41839.06	-9.89		
Uranus	I	2031-02-05T22:42:08.437		43.92	-14.68	25558.42		-0.24	-0.26
Uranus	E	2031-02-06T00:07:59.142		41.37	-31.72	25538.22		1.47	1.54
6	E	2031-02-06T00:35:33.605		38.73	-36.60	41839.80	9.83		
5	E	2031-02-06T00:36:07.544		38.67	-36.69	42174.42	9.83		
4	E	2031-02-06T00:36:43.402		38.61	-36.80	42526.51	9.83		
alpha	E	2031-02-06T00:40:23.050		38.20	-37.41	44685.24	9.83		
beta	E	2031-02-06T00:42:02.004		38.01	-37.68	45657.26	9.82		
eta	E	2031-02-06T00:44:36.625		37.71	-38.11	47176.12	9.82		
gamma	E	2031-02-06T00:45:22.621		37.62	-38.24	47627.88	9.82		
delta	E	2031-02-06T00:46:31.092		37.48	-38.42	48300.35	9.82		
lambda	E	2031-02-06T00:49:26.903		37.13	-38.90	50026.71	9.82		
epsilon	E	2031-02-06T00:51:37.042		36.87	-39.24	51304.32	9.81		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-05T23:29:35.300
 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 : 3415398125956056832
 2Mass ID (if available) : 05101360+2302401
 ICRS Star Coord at Epoch: 05h 10m 13.61374s +23:02:39.87763s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 13.438
 G magnitude : 16.821
 RP magnitude : 15.819
 BP magnitude : 17.792
 DUPflag : 0
 Distance (au) : 18.604
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.47
 Sun-Target sep (deg) : 122.03
 Sun-Moon sep (deg) : 41.15
 B (ring opening deg) : 82.13
 PA of pole (deg) : 1.73
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.135
 C/A sky separation (km) : 1824.3
 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_itrfr93_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	2031-02-05T22:03:09.631		23.94	19.12x	50956.12	-9.77		
lambda	I	2031-02-05T22:04:44.689		24.17	18.77x	50026.71	-9.78		
delta	I	2031-02-05T22:07:41.231		24.60	18.14x	48300.35	-9.78		
gamma	I	2031-02-05T22:08:50.368		24.77	17.89x	47624.17	-9.78		
eta	I	2031-02-05T22:09:36.178		24.88	17.72x	47176.12	-9.78		
beta	I	2031-02-05T22:12:10.462		25.25	17.17x	45666.96	-9.78		
alpha	I	2031-02-05T22:13:44.100		25.47	16.83x	44750.97	-9.78		
4	I	2031-02-05T22:17:22.393		25.98	16.04x	42614.97	-9.79		
5	I	2031-02-05T22:17:54.515		26.06	15.93x	42300.81	-9.79		
6	I	2031-02-05T22:18:41.646		26.16	15.76x	41839.19	-9.79		
Uranus	I	2031-02-05T22:46:22.145		29.76	9.83x	25558.47		-0.23	-0.25
Uranus	E	2031-02-06T00:12:42.626		37.01	-8.12	25540.91		1.37	1.43
6	E	2031-02-06T00:40:17.494		37.76	-13.58	41839.34	9.84		
5	E	2031-02-06T00:40:51.405		37.76	-13.69	42173.87	9.84		
4	E	2031-02-06T00:41:27.299		37.77	-13.81	42526.59	9.84		
alpha	E	2031-02-06T00:45:06.743		37.80	-14.52	44685.31	9.84		
beta	E	2031-02-06T00:46:45.554		37.81	-14.84	45657.05	9.84		
eta	E	2031-02-06T00:49:19.993		37.82	-15.33	47176.12	9.84		
gamma	E	2031-02-06T00:50:05.927		37.82	-15.48	47627.94	9.84		
delta	E	2031-02-06T00:51:14.289		37.82	-15.70	48300.35	9.84		
lambda	E	2031-02-06T00:54:09.801		37.82	-16.26	50026.71	9.84		
epsilon	E	2031-02-06T00:56:20.081		37.81	-16.67	51308.15	9.83		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-05T23:17:10.810
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : SAAO
 Location : So. Afr. Astro. Obs. (Sutherland)
 Latitude (deg) : -32.37953
 E. Longitude (deg) : 20.81070
 Altitude (km) : 1.768
 Gaia source ID : 3415398125956056832
 2Mass ID (if available) : 05101360+2302401
 ICRS Star Coord at Epoch: 05h 10m 13.61374s +23:02:39.87763s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 13.438
 G magnitude : 16.821
 RP magnitude : 15.819
 BP magnitude : 17.792
 DUPflag : 0
 Distance (au) : 18.604
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.47
 Sun-Target sep (deg) : 122.03
 Sun-Moon sep (deg) : 40.08
 B (ring opening deg) : 82.13
 PA of pole (deg) : 1.73
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.168
 C/A sky separation (km) : 2263.5
 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	2031-02-05T21:49:46.917		19.33	-39.86	50961.07	-9.76		
lambda	I	2031-02-05T21:51:22.604		19.09	-39.97	50026.71	-9.76		
delta	I	2031-02-05T21:54:19.477		18.65	-40.16	48300.35	-9.76		
gamma	I	2031-02-05T21:55:28.774		18.47	-40.24	47624.24	-9.76		
eta	I	2031-02-05T21:56:14.712		18.36	-40.29	47176.12	-9.75		
beta	I	2031-02-05T21:58:49.497		17.96	-40.45	45666.71	-9.75		
alpha	I	2031-02-05T22:00:23.437		17.72	-40.54	44751.09	-9.75		
4	I	2031-02-05T22:04:02.663		17.16	-40.75	42615.11	-9.74		
5	I	2031-02-05T22:04:35.014		17.07	-40.77	42300.25	-9.74		
6	I	2031-02-05T22:05:22.368		16.95	-40.82	41838.69	-9.74		
Uranus	I	2031-02-05T22:33:17.625		12.43	-41.86	25558.27		-0.28	-0.29
Uranus	E	2031-02-06T00:01:23.923		-3.52x	-39.16	25532.11		1.67	1.75
6	E	2031-02-06T00:29:59.193		-9.09x	-36.50	41840.69	9.47		
5	E	2031-02-06T00:30:34.435		-9.20x	-36.43	42175.54	9.47		
4	E	2031-02-06T00:31:11.527		-9.32x	-36.37	42526.37	9.47		
alpha	E	2031-02-06T00:34:59.592		-10.08x	-35.95	44685.11	9.46		
beta	E	2031-02-06T00:36:42.426		-10.41x	-35.76	45657.66	9.46		
eta	E	2031-02-06T00:39:23.013		-10.95x	-35.46	47176.12	9.45		
gamma	E	2031-02-06T00:40:10.794		-11.10x	-35.37	47627.78	9.45		
delta	E	2031-02-06T00:41:21.956		-11.34x	-35.24	48300.35	9.45		
lambda	E	2031-02-06T00:44:24.689		-11.95x	-34.88	50026.71	9.44		
epsilon	E	2031-02-06T00:46:39.210		-12.39x	-34.61	51296.98	9.44		