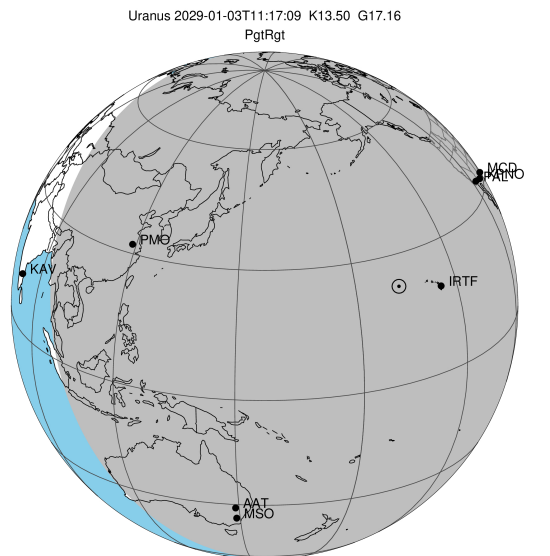


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-01-03T11:17:09.480
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 144911749891782272
 2Mass ID (if available) : 04355879+2200312

ICRS Star Coord at Epoch: 04h 35m 58.78341s +22:00:30.55377s

RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.501
 G magnitude : 17.161
 RP magnitude : 16.027
 BP magnitude : 18.500
 DUPflag : 0
 Distance (au) : 18.451
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.83
 Sun-Target sep (deg) : 147.62
 Sun-Moon sep (deg) : 68.25
 B (ring opening deg) : 79.57
 PA of pole (deg) : -50.47

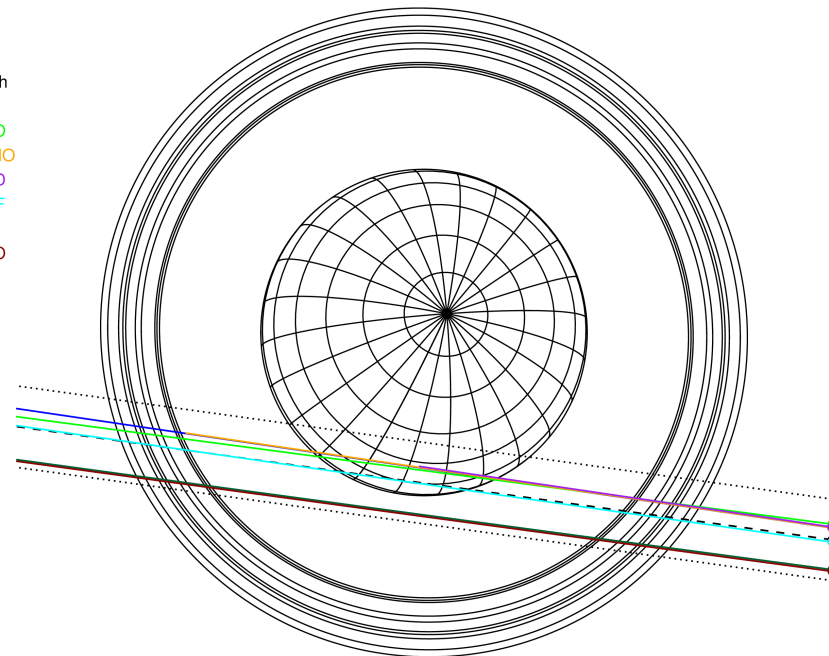
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2029-01-03T11:17:09.4800 α: 04 35 58.7834 δ: +22 00 30.554 C/A 1.741" PA 352.10 deg v_sky -18.83 km/s D 18.45 AU
 Credit: Styled after SORA/Lucky Star

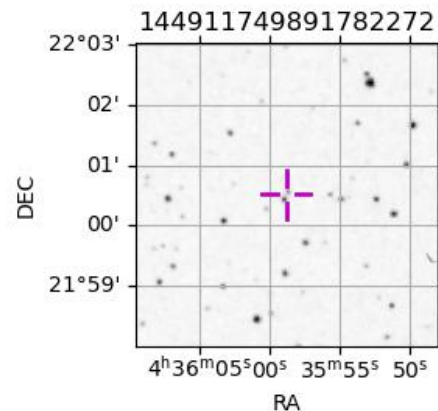
Uranus 2029-01-03T11:17:09 K13.50 G17.16 PgtRgt

Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 AAT
 MSO

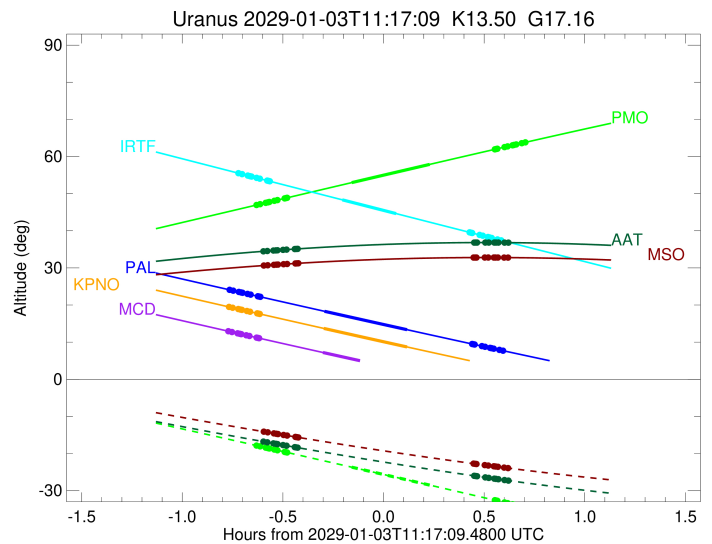
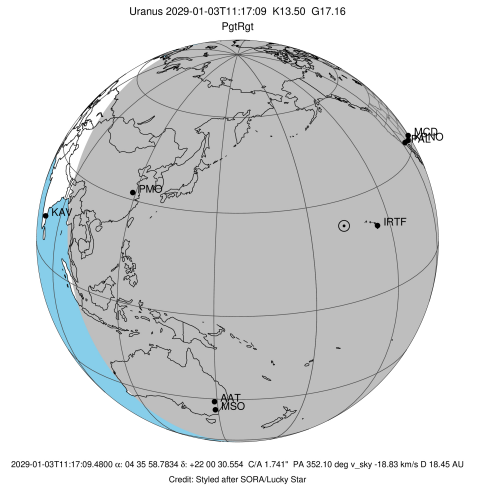


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++	+ +	+++++	JAN 03 10:31 - JAN 03 11:52	PieRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	JAN 03 10:39 - JAN 03 11:59	PieRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	JAN 03 10:30 - JAN 03 11:24	PieRin
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+	+++++	JAN 03 10:30 - JAN 03 10:59	PinRin
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	JAN 03 10:33 - JAN 03 11:52	PieRie
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
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 03 10:41 - JAN 03 11:54	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	JAN 03 10:41 - JAN 03 11:54	PnnRie

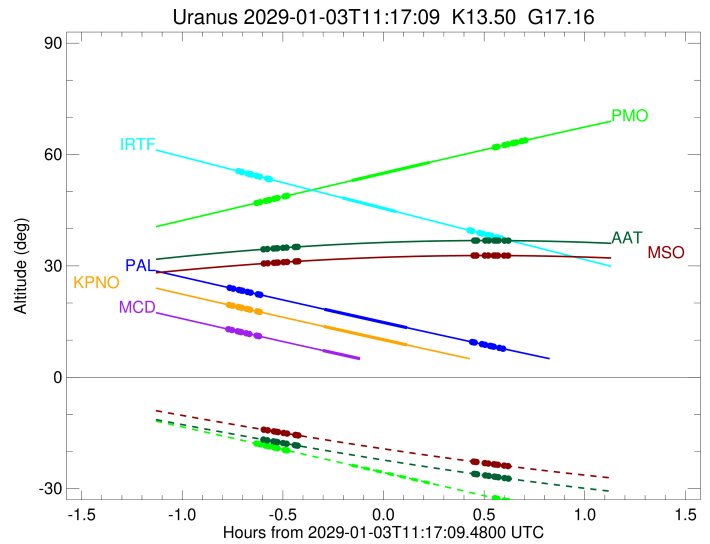
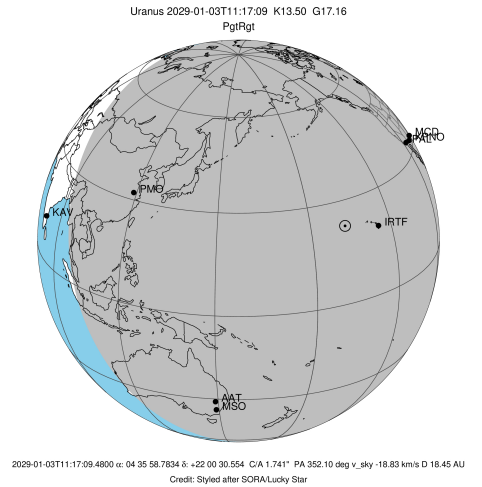


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-01-03T11:12:16.150
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 144911749891782272
 2Mass ID (if available) : 04355879+2200312
 ICRS Star Coord at Epoch: 04h 35m 58.78341s +22:00:30.55377s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.501
 G magnitude : 17.161
 RP magnitude : 16.027
 BP magnitude : 18.500
 DUPflag : 0
 Distance (au) : 18.451
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.83
 Sun-Target sep (deg) : 147.62
 Sun-Moon sep (deg) : 68.16
 B (ring opening deg) : 79.57
 PA of pole (deg) : -50.47
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.573
 C/A sky separation (km) : 21052.6
 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	2029-01-03T10:31:03.009		24.14	-53.63	51400.31	-17.43		
lambda	I	2029-01-03T10:32:22.247		23.86	-53.35	50026.71	-17.28		
delta	I	2029-01-03T10:34:02.540		23.52	-53.01	48300.35	-17.14		
gamma	I	2029-01-03T10:34:41.641		23.39	-52.87	47631.28	-17.08		
eta	I	2029-01-03T10:35:08.320		23.30	-52.78	47176.12	-17.04		
beta	I	2029-01-03T10:36:36.443		22.99	-52.47	45681.11	-16.89		
alpha	I	2029-01-03T10:37:35.262		22.79	-52.27	44690.24	-16.78		
4	I	2029-01-03T10:39:45.130		22.35	-51.82	42527.40	-16.53		
5	I	2029-01-03T10:40:07.555		22.27	-51.74	42155.80	-16.47		
6	I	2029-01-03T10:40:29.681		22.20	-51.66	41795.09	-16.42		
Uranus	I	2029-01-03T10:59:31.913		18.32	-47.69	25527.55		-2.41	-2.52
Uranus	E	2029-01-03T11:24:11.428		13.35	-42.53	25007.28		-10.28	-10.76
6	E	2029-01-03T11:43:34.953		9.51	-38.48	41852.96	16.32		
5	E	2029-01-03T11:44:01.606		9.42	-38.38	42285.03	16.37		
4	E	2029-01-03T11:44:21.083		9.35	-38.32	42603.19	16.42		
alpha	E	2029-01-03T11:46:28.597		8.94	-37.87	44718.41	16.67		
beta	E	2029-01-03T11:47:24.411		8.75	-37.68	45651.58	16.78		
eta	E	2029-01-03T11:48:54.953		8.46	-37.36	47176.12	16.92		
gamma	E	2029-01-03T11:49:21.271		8.37	-37.27	47621.84	16.96		
delta	E	2029-01-03T11:50:01.218		8.24	-37.13	48300.35	17.01		
lambda	E	2029-01-03T11:51:42.277		7.91	-36.78	50026.71	17.15		
epsilon	E	2029-01-03T11:52:51.612		7.69	-36.54	51218.72	17.30		

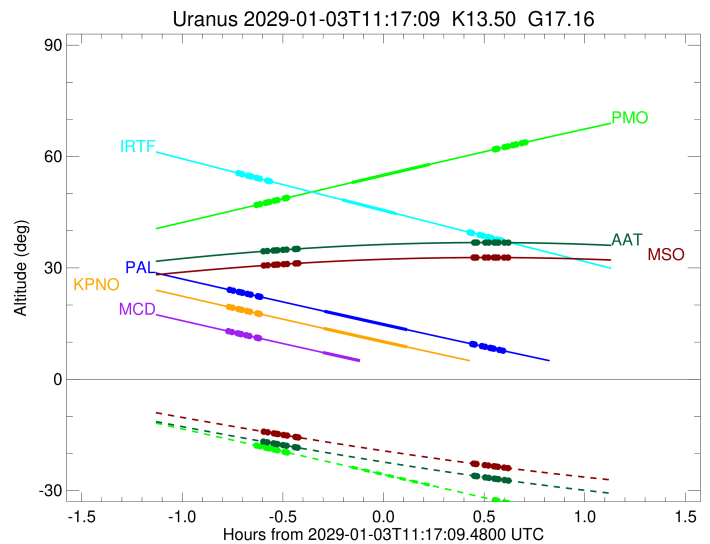
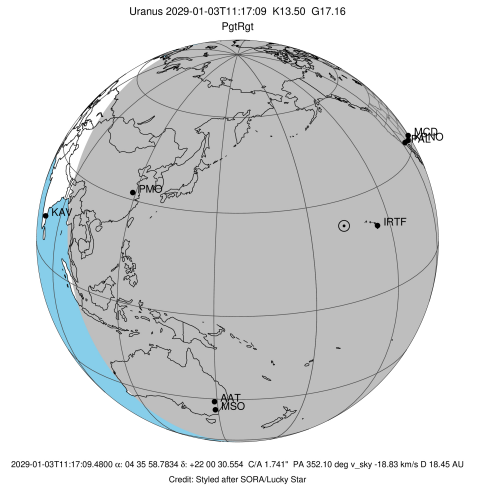
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-01-03T11:19:43.490
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 144911749891782272
 2Mass ID (if available) : 04355879+2200312
 ICRS Star Coord at Epoch: 04h 35m 58.78341s +22:00:30.55377s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.501
 G magnitude : 17.161
 RP magnitude : 16.027
 BP magnitude : 18.500
 DUPflag : 0
 Distance (au) : 18.451
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.83
 Sun-Target sep (deg) : 147.62
 Sun-Moon sep (deg) : 69.18
 B (ring opening deg) : 79.57
 PA of pole (deg) : -50.47
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.602
 C/A sky separation (km) : 21440.4
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.bsp
 ural161.bsp
 vgr2.ural161.bsp
 peph.ural160.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	2029-01-03T10:39:04.057		46.89	-17.81	51398.42	-17.49		
lambda	I	2029-01-03T10:40:22.936		47.17	-18.07	50026.71	-17.34		
delta	I	2029-01-03T10:42:02.920		47.53	-18.41	48300.35	-17.19		
gamma	I	2029-01-03T10:42:41.904		47.67	-18.55	47631.29	-17.13		
eta	I	2029-01-03T10:43:08.505		47.76	-18.64	47176.12	-17.09		
beta	I	2029-01-03T10:44:36.379		48.07	-18.94	45681.10	-16.94		
alpha	I	2029-01-03T10:45:35.037		48.28	-19.14	44690.32	-16.82		
4	I	2029-01-03T10:47:44.602		48.74	-19.58	42527.36	-16.56		
5	I	2029-01-03T10:48:06.978		48.82	-19.65	42155.75	-16.51		
6	I	2029-01-03T10:48:29.058		48.90	-19.73	41795.11	-16.46		
Uranus	I	2029-01-03T11:07:39.135		52.97	-23.67	25523.94		-2.54	-2.66
Uranus	E	2029-01-03T11:30:57.244		57.89	-28.52	25015.91		-10.20	-10.67
6	E	2029-01-03T11:50:21.386		61.94	-32.58	41851.98	16.50		
5	E	2029-01-03T11:50:47.688		62.03	-32.67	42283.47	16.56		
4	E	2029-01-03T11:51:07.005		62.10	-32.74	42602.39	16.61		
alpha	E	2029-01-03T11:53:12.992		62.53	-33.18	44717.60	16.88		
beta	E	2029-01-03T11:54:08.179		62.72	-33.37	45652.00	16.99		
eta	E	2029-01-03T11:55:37.510		63.03	-33.68	47176.12	17.15		
gamma	E	2029-01-03T11:56:03.477		63.12	-33.78	47621.91	17.19		
delta	E	2029-01-03T11:56:42.874		63.26	-33.91	48300.35	17.25		
lambda	E	2029-01-03T11:58:22.507		63.60	-34.26	50026.71	17.40		
epsilon	E	2029-01-03T11:59:31.339		63.83	-34.50	51227.62	17.56		

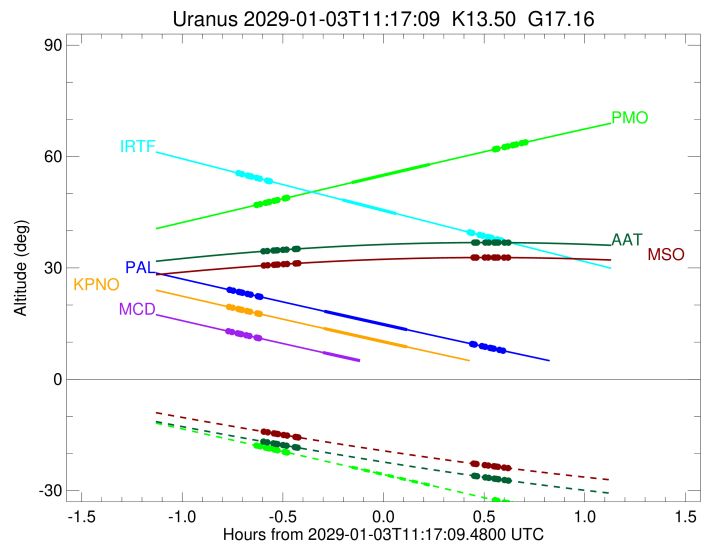
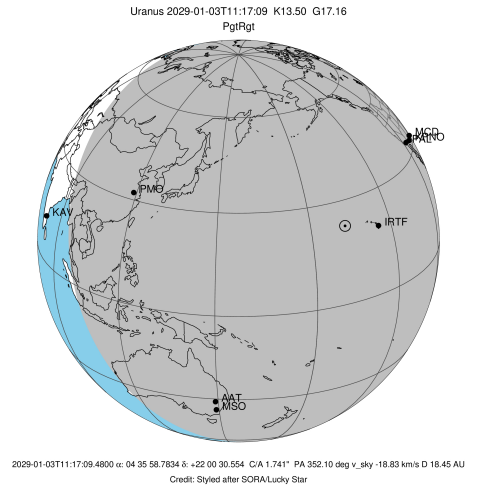
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2029-01-03T11:12:10.740
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      : 144911749891782272
2Mass ID (if available) : 04355879+2200312
ICRS Star Coord at Epoch: 04h 35m 58.78341s +22:00:30.55377s
RUWE (>1.4 is poor) : 1.00
K magnitude          : 13.501
G magnitude          : 17.161
RP magnitude         : 16.027
BP magnitude         : 18.500
DUPflag             : 0
Distance (au)       : 18.451
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -18.83
Sun-Target sep (deg) : 147.62
Sun-Moon sep (deg)  : 68.08
B (ring opening deg) : 79.57
PA of pole (deg)    : -50.47
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.570
C/A sky separation (km) : 21004.1
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_itrff93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



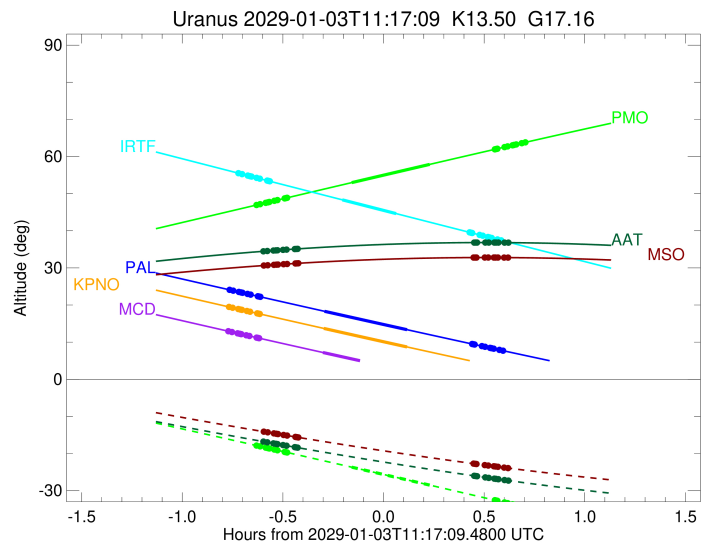
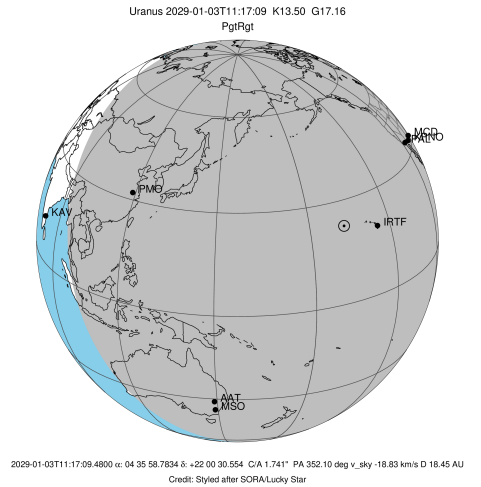
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-01-03T10:30:52.114		19.53	-49.33	51400.13	-17.41		
lambda	I	2029-01-03T10:32:11.438		19.26	-49.04	50026.71	-17.26		
delta	I	2029-01-03T10:33:51.849		18.92	-48.69	48300.35	-17.12		
gamma	I	2029-01-03T10:34:30.995		18.78	-48.55	47631.28	-17.06		
eta	I	2029-01-03T10:34:57.705		18.69	-48.46	47176.12	-17.02		
beta	I	2029-01-03T10:36:25.925		18.39	-48.14	45681.11	-16.87		
alpha	I	2029-01-03T10:37:24.806		18.19	-47.94	44690.25	-16.76		
4	I	2029-01-03T10:39:34.807		17.74	-47.48	42527.39	-16.51		
5	I	2029-01-03T10:39:57.253		17.66	-47.40	42155.78	-16.46		
6	I	2029-01-03T10:40:19.399		17.59	-47.32	41795.10	-16.41		
Uranus	I	2029-01-03T10:59:21.312		13.70	-43.28	25528.33		-2.38	-2.49
Uranus	E	2029-01-03T11:24:11.261		8.70	-38.01	25006.59		-10.29	-10.77
6	E	2029-01-03T11:43:34.599		4.87x	-33.92	41853.03	16.31		
5	E	2029-01-03T11:44:01.285		4.78x	-33.83	42285.14	16.35		
4	E	2029-01-03T11:44:20.779		4.72x	-33.76	42603.25	16.40		
alpha	E	2029-01-03T11:46:28.443		4.30x	-33.31	44718.47	16.65		
beta	E	2029-01-03T11:47:24.322		4.12x	-33.11	45651.56	16.75		
eta	E	2029-01-03T11:48:54.982		3.82x	-32.80	47176.12	16.89		
gamma	E	2029-01-03T11:49:21.334		3.74x	-32.70	47621.83	16.93		
delta	E	2029-01-03T11:50:01.335		3.61x	-32.56	48300.35	16.99		
lambda	E	2029-01-03T11:51:42.533		3.28x	-32.21	50026.71	17.13		
epsilon	E	2029-01-03T11:52:51.932		3.05x	-31.97	51218.16	17.27		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-01-03T11:12:08.870
 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 : 144911749891782272
 2Mass ID (if available) : 04355879+2200312
 ICRS Star Coord at Epoch: 04h 35m 58.78341s +22:00:30.55377s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.501
 G magnitude : 17.161
 RP magnitude : 16.027
 BP magnitude : 18.500
 DUPflag : 0
 Distance (au) : 18.451
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.83
 Sun-Target sep (deg) : 147.62
 Sun-Moon sep (deg) : 67.98
 B (ring opening deg) : 79.57
 PA of pole (deg) : -50.47
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.558
 C/A sky separation (km) : 20850.1
 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



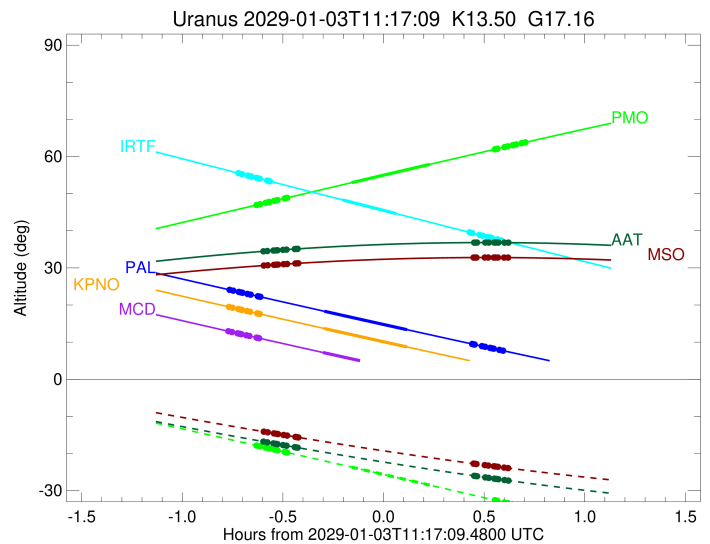
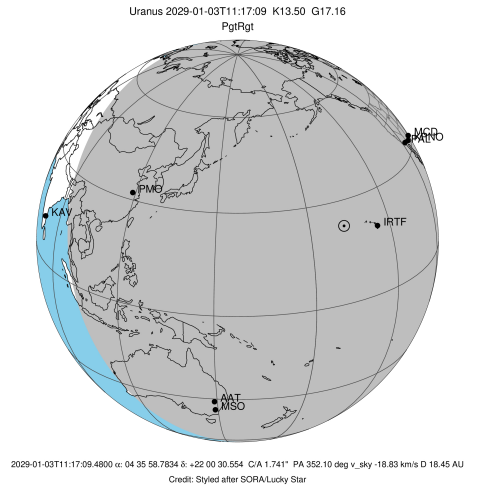
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-01-03T10:30:40.078		12.99	-42.86	51399.23	-17.39		
lambda	I	2029-01-03T10:31:59.436		12.72	-42.57	50026.71	-17.24		
delta	I	2029-01-03T10:33:39.944		12.38	-42.21	48300.35	-17.11		
gamma	I	2029-01-03T10:34:19.124		12.24	-42.07	47631.28	-17.05		
eta	I	2029-01-03T10:34:45.855		12.15	-41.98	47176.12	-17.01		
beta	I	2029-01-03T10:36:14.140		11.85	-41.66	45681.10	-16.86		
alpha	I	2029-01-03T10:37:13.052		11.65	-41.45	44690.32	-16.75		
4	I	2029-01-03T10:39:23.109		11.21	-40.98	42527.34	-16.51		
5	I	2029-01-03T10:39:45.559		11.13	-40.90	42155.74	-16.46		
6	I	2029-01-03T10:40:07.708		11.06	-40.83	41795.12	-16.41		
Uranus	I	2029-01-03T10:59:05.397		7.21	-36.76	25530.93		-2.27	-2.38
Uranus	E	2029-01-03T11:24:23.730		2.18x	-31.37	25004.64		-10.31	-10.79
6	E	2029-01-03T11:43:42.881		-1.58x	-27.28	41853.21	16.30		
5	E	2029-01-03T11:44:09.585		-1.67x	-27.19	42285.43	16.35		
4	E	2029-01-03T11:44:29.075		-1.73x	-27.12	42603.39	16.40		
alpha	E	2029-01-03T11:46:36.806		-2.14x	-26.67	44718.61	16.64		
beta	E	2029-01-03T11:47:32.710		-2.32x	-26.47	45651.48	16.74		
eta	E	2029-01-03T11:49:03.451		-2.61x	-26.16	47176.12	16.88		
gamma	E	2029-01-03T11:49:29.827		-2.69x	-26.06	47621.82	16.92		
delta	E	2029-01-03T11:50:09.868		-2.82x	-25.92	48300.35	16.97		
lambda	E	2029-01-03T11:51:51.176		-3.14x	-25.57	50026.71	17.11		
epsilon	E	2029-01-03T11:53:00.574		-3.36x	-25.32	51216.70	17.25		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-01-03T11:13:20.960
 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 : 144911749891782272
 2Mass ID (if available) : 04355879+2200312
 ICRS Star Coord at Epoch: 04h 35m 58.78341s +22:00:30.55377s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.501
 G magnitude : 17.161
 RP magnitude : 16.027
 BP magnitude : 18.500
 DUPflag : 0
 Distance (au) : 18.451
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.83
 Sun-Target sep (deg) : 147.62
 Sun-Moon sep (deg) : 68.65
 B (ring opening deg) : 79.57
 PA of pole (deg) : -50.47
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.757
 C/A sky separation (km) : 23516.2
 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	2029-01-03T10:33:39.376		55.57	-86.51	51416.02	-17.20		
lambda	I	2029-01-03T10:35:00.700		55.26	-86.35	50026.71	-17.02		
delta	I	2029-01-03T10:36:42.693		54.86	-86.12	48300.35	-16.83		
gamma	I	2029-01-03T10:37:22.538		54.71	-86.02	47631.17	-16.76		
eta	I	2029-01-03T10:37:49.739		54.60	-85.96	47176.12	-16.70		
beta	I	2029-01-03T10:39:19.760		54.25	-85.72	45681.21	-16.51		
alpha	I	2029-01-03T10:40:20.079		54.02	-85.55	44689.16	-16.37		
4	I	2029-01-03T10:42:33.455		53.51	-85.17	42528.23	-16.03		
5	I	2029-01-03T10:42:56.601		53.42	-85.10	42156.79	-15.97		
6	I	2029-01-03T10:43:19.463		53.33	-85.03	41794.82	-15.90		
Uranus	I	2029-01-03T11:04:52.100		48.34	-80.55	25453.76		-4.41	-4.62
Uranus	E	2029-01-03T11:20:55.156		44.63	-76.96	25069.98		-9.66	-10.11
6	E	2029-01-03T11:42:49.270		39.58	-71.97	41850.02	15.83		
5	E	2029-01-03T11:43:16.567		39.47	-71.87	42280.35	15.89		
4	E	2029-01-03T11:43:36.808		39.40	-71.79	42600.80	15.96		
alpha	E	2029-01-03T11:45:47.649		38.89	-71.29	44716.13	16.28		
beta	E	2029-01-03T11:46:44.941		38.67	-71.07	45652.76	16.42		
eta	E	2029-01-03T11:48:17.221		38.32	-70.72	47176.12	16.61		
gamma	E	2029-01-03T11:48:44.027		38.22	-70.62	47622.03	16.66		
delta	E	2029-01-03T11:49:24.647		38.06	-70.46	48300.35	16.74		
lambda	E	2029-01-03T11:51:07.241		37.67	-70.07	50026.71	16.91		
epsilon	E	2029-01-03T11:52:18.808		37.40	-69.80	51241.32	17.10		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-01-03T11:18:17.280
 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 : 144911749891782272
 2Mass ID (if available) : 04355879+2200312
 ICRS Star Coord at Epoch: 04h 35m 58.78341s +22:00:30.55377s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.501
 G magnitude : 17.161
 RP magnitude : 16.027
 BP magnitude : 18.500
 DUPflag : 0
 Distance (au) : 18.451
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.83
 Sun-Target sep (deg) : 147.62
 Sun-Moon sep (deg) : 68.86
 B (ring opening deg) : 79.57
 PA of pole (deg) : -50.47
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.116
 C/A sky separation (km) : 28314.7
 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



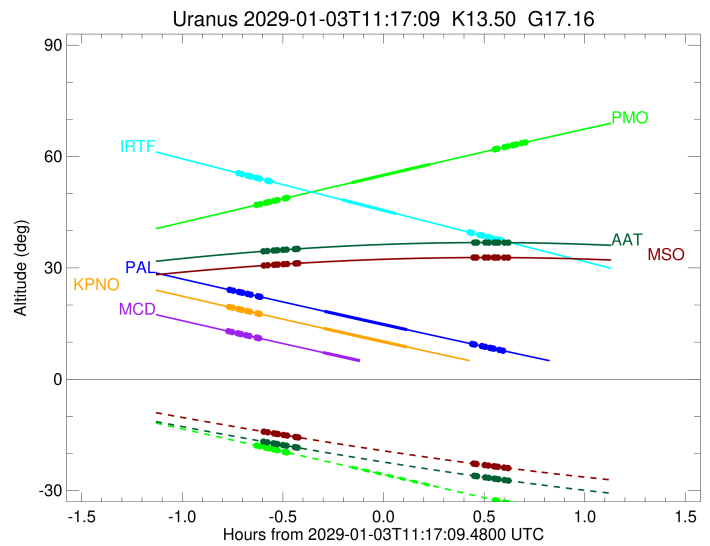
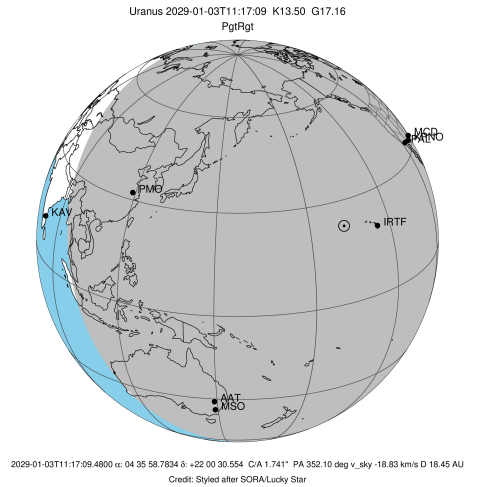
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-01-03T10:41:03.161		34.45	-16.74	51445.80	-16.14		
lambda	I	2029-01-03T10:42:31.942		34.55	-16.98	50026.71	-15.88		
delta	I	2029-01-03T10:44:21.621		34.68	-17.28	48300.35	-15.60		
gamma	I	2029-01-03T10:45:04.707		34.72	-17.39	47630.91	-15.48		
eta	I	2029-01-03T10:45:34.172		34.75	-17.47	47176.12	-15.39		
beta	I	2029-01-03T10:47:12.234		34.86	-17.73	45681.18	-15.09		
alpha	I	2029-01-03T10:48:18.558		34.93	-17.91	44687.25	-14.87		
4	I	2029-01-03T10:50:46.213		35.08	-18.30	42530.59	-14.33		
5	I	2029-01-03T10:51:12.167		35.11	-18.37	42159.99	-14.23		
6	I	2029-01-03T10:51:37.942		35.13	-18.43	41794.88	-14.12		

No planet occultations

6	E	2029-01-03T11:44:10.800		36.82	-26.01	41843.53	14.12		
5	E	2029-01-03T11:44:40.855		36.82	-26.07	42269.63	14.23		
4	E	2029-01-03T11:45:03.872		36.82	-26.12	42595.24	14.34		
alpha	E	2029-01-03T11:47:28.225		36.83	-26.43	44711.38	14.87		
beta	E	2029-01-03T11:48:31.254		36.83	-26.56	45655.34	15.10		
eta	E	2029-01-03T11:50:11.042		36.82	-26.77	47176.12	15.40		
gamma	E	2029-01-03T11:50:39.953		36.82	-26.83	47622.48	15.48		
delta	E	2029-01-03T11:51:23.570		36.82	-26.92	48300.35	15.60		
lambda	E	2029-01-03T11:53:13.215		36.81	-27.15	50026.71	15.88		
epsilon	E	2029-01-03T11:54:32.094		36.80	-27.31	51287.05	16.15		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2029-01-03T11:18:17.880
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       : 144911749891782272
2Mass ID (if available) : 04355879+2200312
ICRS Star Coord at Epoch: 04h 35m 58.78341s +22:00:30.55377s
RUWE (>1.4 is poor) : 1.00
K magnitude           : 13.501
G magnitude           : 17.161
RP magnitude          : 16.027
BP magnitude          : 18.500
DUPflag              : 0
Distance (au)        : 18.451
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -18.83
Sun-Target sep (deg) : 147.62
Sun-Moon sep (deg)   : 68.81
B (ring opening deg) : 79.57
PA of pole (deg)     : -50.47
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.135
C/A sky separation (km) : 28571.1
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	2029-01-03T10:41:10.437		30.62	-14.07	51447.53	-16.07		
lambda	I	2029-01-03T10:42:39.781		30.71	-14.30	50026.71	-15.79		
delta	I	2029-01-03T10:44:30.069		30.83	-14.58	48300.35	-15.51		
gamma	I	2029-01-03T10:45:13.412		30.87	-14.68	47630.89	-15.38		
eta	I	2029-01-03T10:45:43.055		30.90	-14.76	47176.12	-15.30		
beta	I	2029-01-03T10:47:21.754		31.00	-15.01	45681.17	-14.99		
alpha	I	2029-01-03T10:48:28.549		31.06	-15.17	44687.15	-14.76		
4	I	2029-01-03T10:50:57.339		31.20	-15.54	42530.75	-14.21		
5	I	2029-01-03T10:51:23.517		31.22	-15.61	42160.24	-14.11		
6	I	2029-01-03T10:51:49.524		31.25	-15.67	41794.92	-13.99		

No planet occultations

6	E	2029-01-03T11:43:59.963		32.79	-22.72	41843.18	14.00		
5	E	2029-01-03T11:44:30.257		32.79	-22.78	42269.03	14.11		
4	E	2029-01-03T11:44:53.496		32.79	-22.83	42594.93	14.22		
alpha	E	2029-01-03T11:47:18.984		32.79	-23.12	44711.13	14.77		
beta	E	2029-01-03T11:48:22.484		32.79	-23.24	45655.48	14.99		
eta	E	2029-01-03T11:50:02.913		32.79	-23.44	47176.12	15.30		
gamma	E	2029-01-03T11:50:32.004		32.79	-23.50	47622.50	15.39		
delta	E	2029-01-03T11:51:15.880		32.79	-23.58	48300.35	15.51		
lambda	E	2029-01-03T11:53:06.138		32.78	-23.79	50026.71	15.80		
epsilon	E	2029-01-03T11:54:25.569		32.77	-23.94	51289.32	16.07		