

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-01-05T13:52:45.000  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3427825119907556992  
 2Mass ID (if available) : 05532736+2338434

Uranus 2033-01-05T13:52:45 K11.29 G15.68 PgtRgt

ICRS Star Coord at Epoch: 05h 53m 27.36929s +23:38:43.40594s

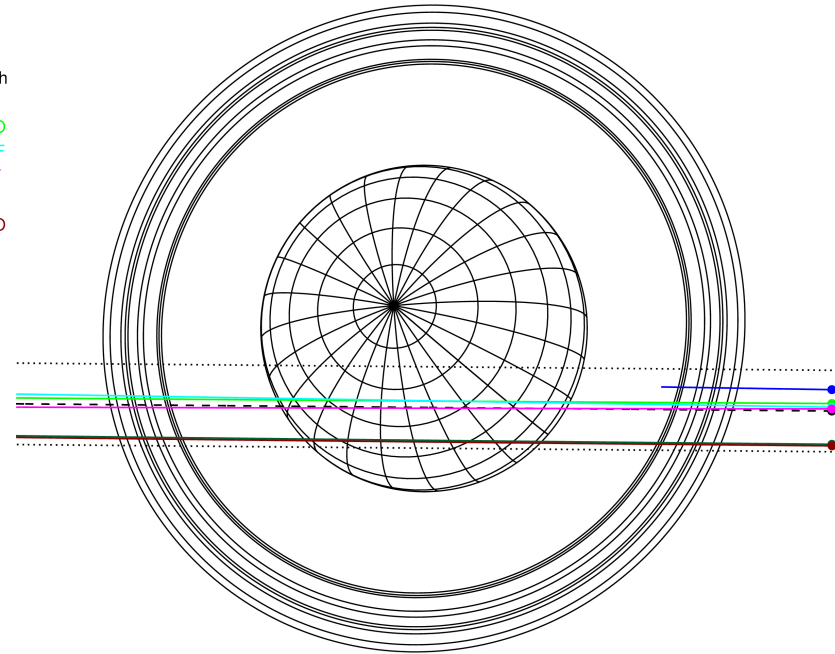
RUWE (>1.4 is poor) : 1.09  
 K magnitude : 11.293  
 G magnitude : 15.684  
 RP magnitude : 14.529  
 BP magnitude : 17.085  
 DUPflag : 0  
 Distance (au) : 18.072  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.19  
 Sun-Target sep (deg) : 163.42  
 Sun-Moon sep (deg) : 107.27  
 B (ring opening deg) : 76.58  
 PA of pole (deg) : 52.87

Uranus 2033-01-05T13:52:45 K11.29 G15.68  
 PgtRgt



2033-01-05T13:52:45.000000 ra: 05 53 27.3693 s: +23 38 43.406 C/A 0.936 PA 359.49 deg v\_sky -22.19 km/s D 18.07 AU  
 Credit: Styled after SORA/Lucky Star

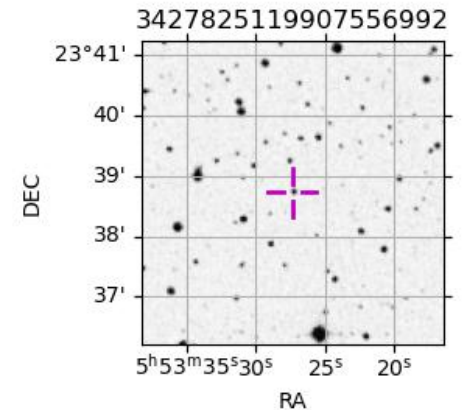
Earth  
 PAL  
 PMO  
 IRTF  
 KAV  
 AAT  
 MSO



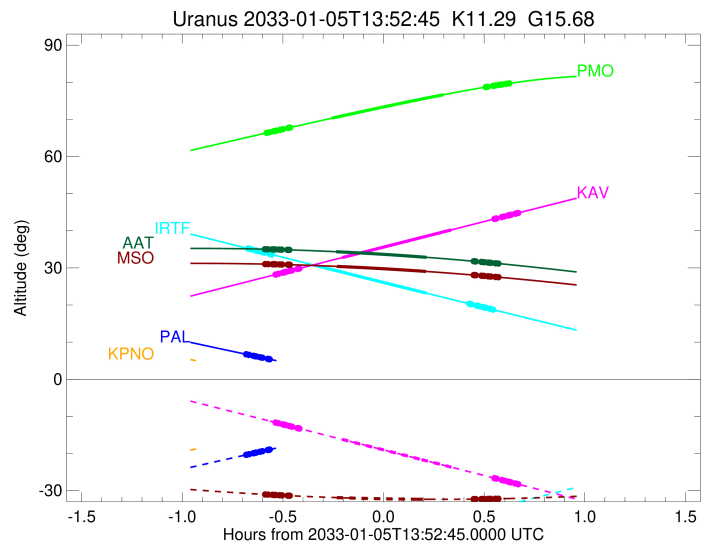
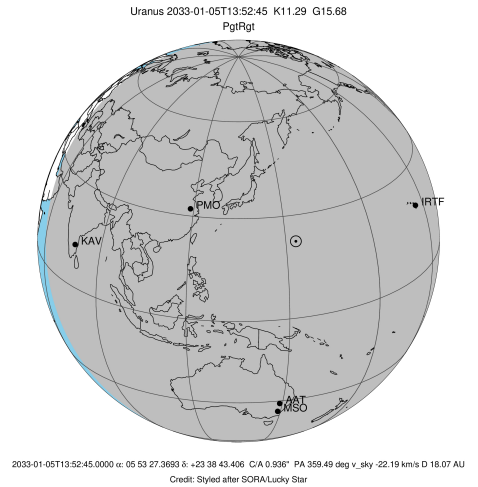
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	+++++			JAN 05 13:12 - JAN 05 13:18	PnnRin
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	JAN 05 13:18 - JAN 05 14:30	PieRie
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	JAN 05 13:12 - JAN 05 14:25	PieRie
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	JAN 05 13:20 - JAN 05 14:32	PieRie
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 05 13:17 - JAN 05 14:27	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+ +	+++++	JAN 05 13:17 - JAN 05 14:27	PieRie

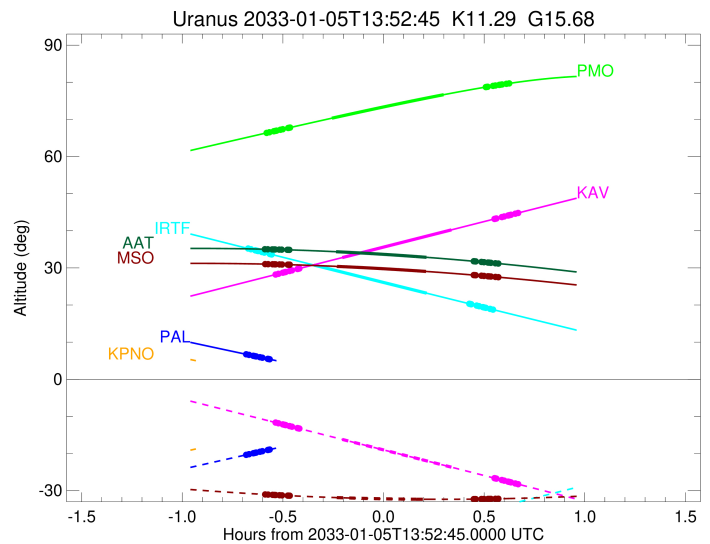
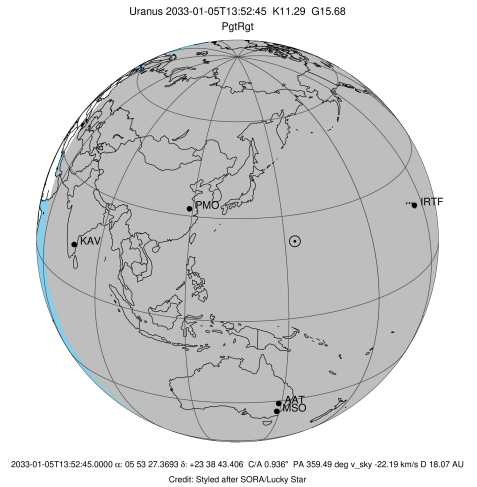


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-01-05T13:48:56.820  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3427825119907556992  
 2Mass ID (if available) : 05532736+2338434  
 ICRS Star Coord at Epoch: 05h 53m 27.36929s +23:38:43.40594s  
 RUWE (>1.4 is poor) : 1.09  
 K magnitude : 11.293  
 G magnitude : 15.684  
 RP magnitude : 14.529  
 BP magnitude : 17.085  
 DUPflag : 0  
 Distance (au) : 18.072  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.19  
 Sun-Target sep (deg) : 163.42  
 Sun-Moon sep (deg) : 107.03  
 B (ring opening deg) : 76.58  
 PA of pole (deg) : 52.87  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.654  
 C/A sky separation (km) : 8569.4  
 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\_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	2033-01-05T13:12:00.514		6.69	-20.32	50892.39	-22.19		
lambda	I	2033-01-05T13:12:39.489		6.57	-20.19	50026.71	-22.20		
delta	I	2033-01-05T13:13:57.285		6.32	-19.92	48300.35	-22.18		
gamma	I	2033-01-05T13:14:27.522		6.22	-19.82	47629.96	-22.16		
eta	I	2033-01-05T13:14:48.001		6.16	-19.75	47176.12	-22.16		
beta	I	2033-01-05T13:15:56.066		5.94	-19.52	45668.53	-22.13		
alpha	I	2033-01-05T13:16:39.054		5.80	-19.38	44720.41	-22.11		
4	I	2033-01-05T13:18:14.197		5.50	-19.06	42614.39	-22.06		
5	I	2033-01-05T13:18:33.660		5.44	-18.99	42195.42	-22.05		
6	I	2033-01-05T13:18:50.761		5.38	-18.93	41813.06	-22.05		
Uranus	I	2033-01-05T13:31:11.678		3.05x	-16.45	25046.91		-12.88	-13.47
Uranus	E	2033-01-05T14:06:59.586		-3.53x	-9.35	25381.59		7.46	7.81
6	E	2033-01-05T14:19:30.204		-5.75x	-6.92	41873.44	21.94		
5	E	2033-01-05T14:19:46.964		-5.80x	-6.87	42243.19	21.94		
4	E	2033-01-05T14:20:00.289		-5.84x	-6.82	42526.14	21.95		
alpha	E	2033-01-05T14:21:39.195		-6.13x	-6.51	44703.91	22.00		
beta	E	2033-01-05T14:22:22.129		-6.25x	-6.37	45647.34	22.01		
eta	E	2033-01-05T14:23:31.531		-6.45x	-6.14	47176.12	22.04		
gamma	E	2033-01-05T14:23:51.736		-6.51x	-6.08	47621.46	22.05		
delta	E	2033-01-05T14:24:22.524		-6.60x	-5.98	48300.35	22.06		
lambda	E	2033-01-05T14:25:40.757		-6.83x	-5.73	50026.71	22.08		
epsilon	E	2033-01-05T14:26:37.589		-6.99x	-5.55	51281.91	22.07		

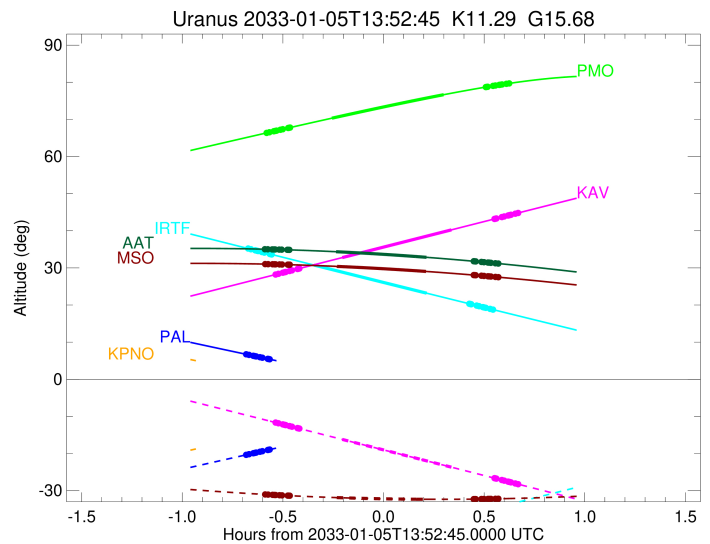
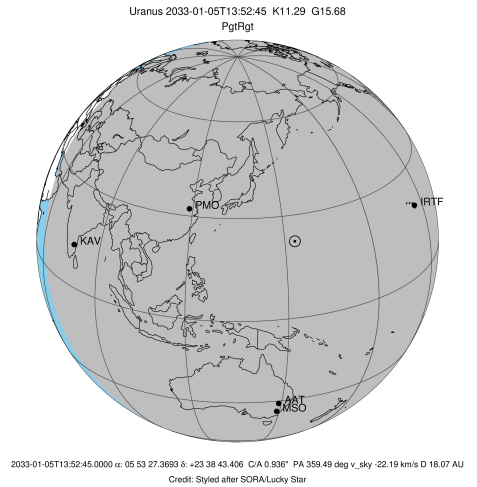
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-01-05T13:53:51.340  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 3427825119907556992  
 2Mass ID (if available) : 05532736+2338434  
 ICRS Star Coord at Epoch: 05h 53m 27.36929s +23:38:43.40594s  
 RUWE (>1.4 is poor) : 1.09  
 K magnitude : 11.293  
 G magnitude : 15.684  
 RP magnitude : 14.529  
 BP magnitude : 17.085  
 DUPflag : 0  
 Distance (au) : 18.072  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.19  
 Sun-Target sep (deg) : 163.42  
 Sun-Moon sep (deg) : 108.25  
 B (ring opening deg) : 76.58  
 PA of pole (deg) : 52.87  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.866  
 C/A sky separation (km) : 11355.0  
 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	2033-01-05T13:18:07.073		66.41	-50.87	50877.92	-22.33		
lambda	I	2033-01-05T13:18:45.157		66.54	-51.00	50026.71	-22.34		
delta	I	2033-01-05T13:20:02.509		66.81	-51.28	48300.35	-22.30		
gamma	I	2033-01-05T13:20:32.599		66.91	-51.38	47629.76	-22.28		
eta	I	2033-01-05T13:20:52.969		66.98	-51.46	47176.12	-22.26		
beta	I	2033-01-05T13:22:00.780		67.21	-51.70	45667.51	-22.21		
alpha	I	2033-01-05T13:22:43.657		67.36	-51.85	44718.53	-22.18		
4	I	2033-01-05T13:24:18.504		67.68	-52.18	42613.49	-22.10		
5	I	2033-01-05T13:24:38.063		67.75	-52.25	42191.33	-22.08		
6	I	2033-01-05T13:24:54.837		67.81	-52.31	41815.21	-22.08		
Uranus	I	2033-01-05T13:37:23.262		70.34	-54.95	25020.37		-13.22	-13.83
Uranus	E	2033-01-05T14:10:40.150		76.65	-61.92	25443.67		6.00	6.28
6	E	2033-01-05T14:23:16.092		78.71	-64.52	41875.05	22.10		
5	E	2033-01-05T14:23:32.403		78.75	-64.58	42237.05	22.10		
4	E	2033-01-05T14:23:45.897		78.79	-64.62	42526.60	22.12		
alpha	E	2033-01-05T14:25:23.843		79.03	-64.96	44701.73	22.21		
beta	E	2033-01-05T14:26:06.395		79.13	-65.10	45646.34	22.24		
eta	E	2033-01-05T14:27:15.100		79.30	-65.34	47176.12	22.29		
gamma	E	2033-01-05T14:27:35.068		79.34	-65.40	47621.32	22.30		
delta	E	2033-01-05T14:28:05.502		79.41	-65.51	48300.35	22.32		
lambda	E	2033-01-05T14:29:22.761		79.59	-65.77	50026.71	22.37		
epsilon	E	2033-01-05T14:30:17.727		79.71	-65.96	51257.01	22.36		

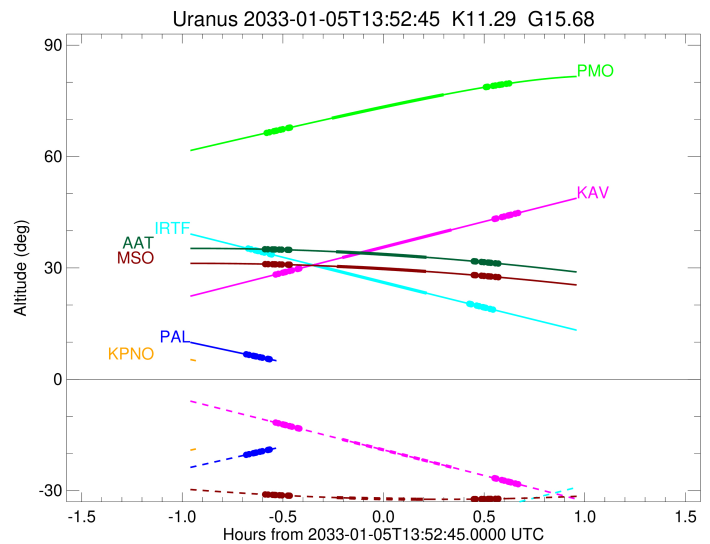
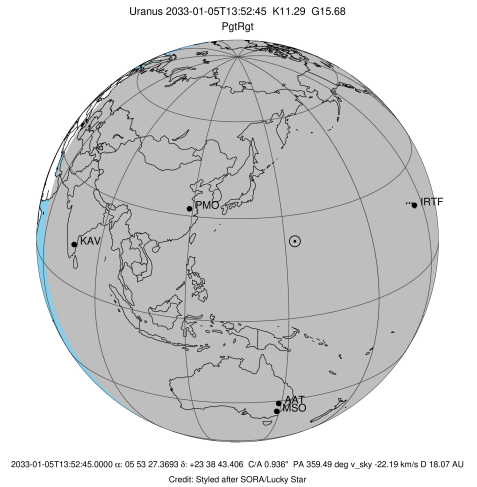
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-01-05T13:48:36.990
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       : 3427825119907556992
2Mass ID (if available) : 05532736+2338434
ICRS Star Coord at Epoch: 05h 53m 27.36929s +23:38:43.40594s
RUWE (>1.4 is poor) : 1.09
K magnitude           : 11.293
G magnitude          : 15.684
RP magnitude         : 14.529
BP magnitude         : 17.085
DUPflag              : 0
Distance (au)        : 18.072
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -22.19
Sun-Target sep (deg) : 163.42
Sun-Moon sep (deg)   : 107.43
B (ring opening deg) : 76.58
PA of pole (deg)     : 52.87
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.863
C/A sky separation (km) : 11312.8
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_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	2033-01-05T13:12:36.298		35.17	-51.49	50875.39	-22.21		
lambda	I	2033-01-05T13:13:14.473		35.02	-51.35	50026.71	-22.22		
delta	I	2033-01-05T13:14:32.248		34.73	-51.05	48300.35	-22.17		
gamma	I	2033-01-05T13:15:02.506		34.62	-50.93	47629.72	-22.15		
eta	I	2033-01-05T13:15:22.989		34.54	-50.85	47176.12	-22.14		
beta	I	2033-01-05T13:16:31.189		34.28	-50.59	45667.35	-22.09		
alpha	I	2033-01-05T13:17:14.318		34.12	-50.43	44718.25	-22.05		
4	I	2033-01-05T13:18:49.714		33.76	-50.06	42613.36	-21.97		
5	I	2033-01-05T13:19:09.405		33.68	-49.98	42190.79	-21.95		
6	I	2033-01-05T13:19:26.237		33.62	-49.92	41815.50	-21.95		
Uranus	I	2033-01-05T13:31:59.430		30.77	-47.03	25019.05		-13.24	-13.84
Uranus	E	2033-01-05T14:05:36.979		23.19	-39.32	25438.67		6.13	6.42
6	E	2033-01-05T14:18:21.201		20.34	-36.41	41874.86	21.84		
5	E	2033-01-05T14:18:37.749		20.28	-36.34	42237.85	21.84		
4	E	2033-01-05T14:18:51.368		20.22	-36.29	42526.53	21.86		
alpha	E	2033-01-05T14:20:30.512		19.86	-35.91	44702.02	21.94		
beta	E	2033-01-05T14:21:13.577		19.70	-35.75	45646.47	21.97		
eta	E	2033-01-05T14:22:23.122		19.44	-35.49	47176.12	22.02		
gamma	E	2033-01-05T14:22:43.338		19.36	-35.41	47621.33	22.03		
delta	E	2033-01-05T14:23:14.150		19.25	-35.29	48300.35	22.05		
lambda	E	2033-01-05T14:24:32.378		18.96	-34.99	50026.71	22.09		
epsilon	E	2033-01-05T14:25:28.213		18.75	-34.78	51260.83	22.08		

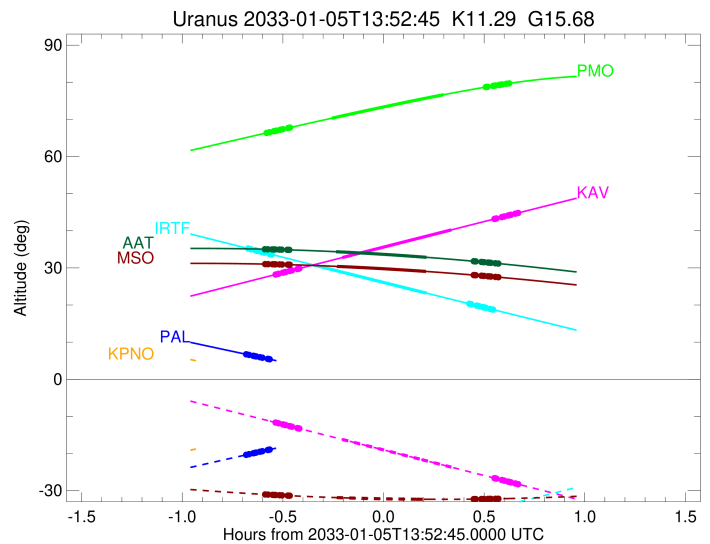
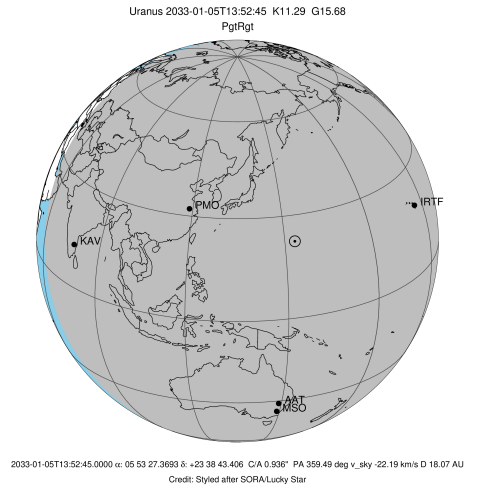
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-01-05T13:56:32.260  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KAV  
 Location : Kavalur Observatory  
 Latitude (deg) : 12.57556  
 E. Longitude (deg) : 78.83167  
 Altitude (km) : 0.722  
 Gaia source ID : 3427825119907556992  
 2Mass ID (if available) : 05532736+2338434  
 ICRS Star Coord at Epoch: 05h 53m 27.36929s +23:38:43.40594s  
 RUWE (>1.4 is poor) : 1.09  
 K magnitude : 11.293  
 G magnitude : 15.684  
 RP magnitude : 14.529  
 BP magnitude : 17.085  
 DUPflag : 0  
 Distance (au) : 18.072  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.19  
 Sun-Target sep (deg) : 163.42  
 Sun-Moon sep (deg) : 108.07  
 B (ring opening deg) : 76.58  
 PA of pole (deg) : 52.87  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.953  
 C/A sky separation (km) : 12488.7  
 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\_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	2033-01-05T13:20:48.112		28.26	-11.71	50872.33	-22.04		
lambda	I	2033-01-05T13:21:26.441		28.41	-11.86	50026.71	-22.05		
delta	I	2033-01-05T13:22:44.827		28.71	-12.16	48300.35	-22.00		
gamma	I	2033-01-05T13:23:15.332		28.83	-12.27	47629.67	-21.97		
eta	I	2033-01-05T13:23:35.979		28.91	-12.35	47176.12	-21.96		
beta	I	2033-01-05T13:24:44.761		29.17	-12.61	45667.10	-21.90		
alpha	I	2033-01-05T13:25:28.276		29.34	-12.78	44717.78	-21.86		
4	I	2033-01-05T13:27:04.528		29.70	-13.14	42613.09	-21.77		
5	I	2033-01-05T13:27:24.437		29.78	-13.22	42189.74	-21.74		
6	I	2033-01-05T13:27:41.350		29.84	-13.28	41816.09	-21.74		
Uranus	I	2033-01-05T13:40:26.230		32.77	-16.20	25013.05		-13.32	-13.92
Uranus	E	2033-01-05T14:13:00.516		40.25	-23.68	25467.50		5.34	5.59
6	E	2033-01-05T14:25:51.752		43.19	-26.64	41875.68	21.83		
5	E	2033-01-05T14:26:08.127		43.25	-26.71	42234.40	21.83		
4	E	2033-01-05T14:26:21.907		43.31	-26.76	42526.88	21.86		
alpha	E	2033-01-05T14:28:00.965		43.68	-27.14	44700.82	21.96		
beta	E	2033-01-05T14:28:44.011		43.85	-27.30	45645.93	22.00		
eta	E	2033-01-05T14:29:53.472		44.11	-27.57	47176.12	22.06		
gamma	E	2033-01-05T14:30:13.645		44.19	-27.65	47621.26	22.07		
delta	E	2033-01-05T14:30:44.390		44.31	-27.77	48300.35	22.10		
lambda	E	2033-01-05T14:32:02.407		44.60	-28.07	50026.71	22.16		
epsilon	E	2033-01-05T14:32:57.394		44.81	-28.28	51246.05	22.15		



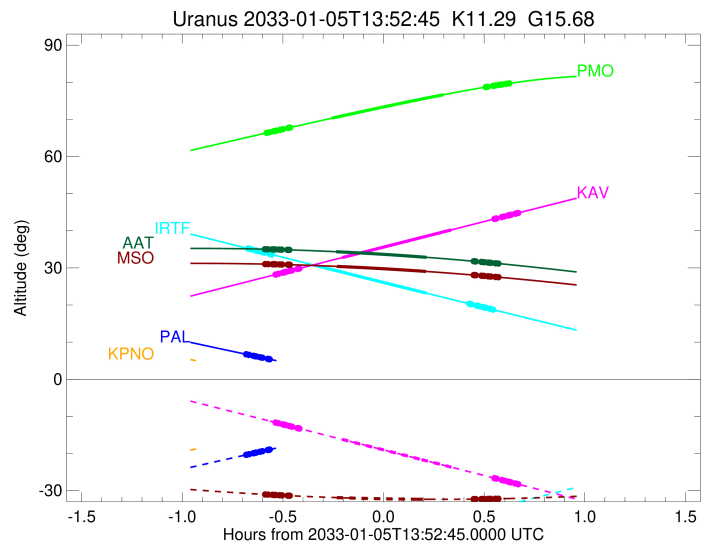
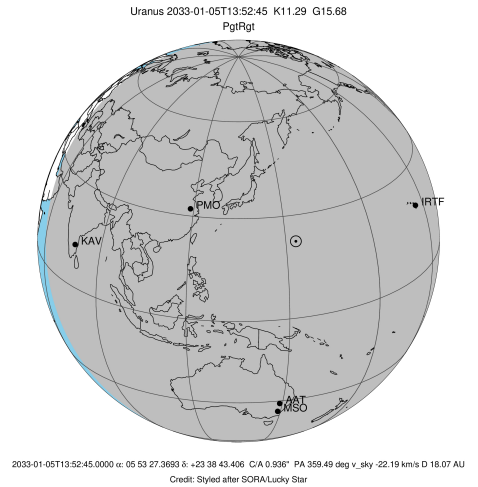
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-01-05T13:51:49.520  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 3427825119907556992  
 2Mass ID (if available) : 05532736+2338434  
 ICRS Star Coord at Epoch: 05h 53m 27.36929s +23:38:43.40594s  
 RUWE (>1.4 is poor) : 1.09  
 K magnitude : 11.293  
 G magnitude : 15.684  
 RP magnitude : 14.529  
 BP magnitude : 17.085  
 DUPflag : 0  
 Distance (au) : 18.072  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.19  
 Sun-Target sep (deg) : 163.42  
 Sun-Moon sep (deg) : 107.72  
 B (ring opening deg) : 76.58  
 PA of pole (deg) : 52.87  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.336  
 C/A sky separation (km) : 17512.4  
 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



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-05T13:17:37.442	35.03	-34.96	50840.89	-21.51		
lambda	I	2033-01-05T13:18:15.256	35.02	-34.99	50026.71	-21.51		
delta	I	2033-01-05T13:19:35.735	34.99	-35.06	48300.35	-21.39		
gamma	I	2033-01-05T13:20:07.142	34.98	-35.09	47629.16	-21.35		
eta	I	2033-01-05T13:20:28.382	34.97	-35.11	47176.12	-21.31		
beta	I	2033-01-05T13:21:39.466	34.94	-35.17	45664.64	-21.19		
alpha	I	2033-01-05T13:22:24.588	34.92	-35.20	44713.44	-21.11		
4	I	2033-01-05T13:24:04.466	34.87	-35.28	42610.36	-20.91		
5	I	2033-01-05T13:24:25.434	34.86	-35.30	42181.13	-20.86		
6	I	2033-01-05T13:24:42.361	34.86	-35.31	41821.37	-20.84		
Uranus	I	2033-01-05T13:38:38.356	34.36	-35.87	25015.01		-13.29	-13.90
Uranus	E	2033-01-05T14:05:33.243	32.85	-36.36	25541.11		2.35	2.46
6	E	2033-01-05T14:19:40.993	31.79	-36.31	41877.60	20.82		
5	E	2033-01-05T14:19:57.633	31.77	-36.31	42224.75	20.83		
4	E	2033-01-05T14:20:12.528	31.75	-36.31	42528.30	20.88		
alpha	E	2033-01-05T14:21:55.756	31.61	-36.29	44697.68	21.08		
beta	E	2033-01-05T14:22:40.608	31.54	-36.27	45644.59	21.16		
eta	E	2033-01-05T14:23:52.765	31.44	-36.26	47176.12	21.28		
gamma	E	2033-01-05T14:24:13.657	31.41	-36.25	47621.10	21.32		
delta	E	2033-01-05T14:24:45.486	31.37	-36.24	48300.35	21.36		
lambda	E	2033-01-05T14:26:06.081	31.25	-36.22	50026.71	21.48		
epsilon	E	2033-01-05T14:27:00.994	31.17	-36.20	51207.91	21.48		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-01-05T13:51:52.330  
 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 : 3427825119907556992  
 2Mass ID (if available) : 05532736+2338434  
 ICRS Star Coord at Epoch: 05h 53m 27.36929s +23:38:43.40594s  
 RUWE (>1.4 is poor) : 1.09  
 K magnitude : 11.293  
 G magnitude : 15.684  
 RP magnitude : 14.529  
 BP magnitude : 17.085  
 DUPflag : 0  
 Distance (au) : 18.072  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.19  
 Sun-Target sep (deg) : 163.42  
 Sun-Moon sep (deg) : 107.66  
 B (ring opening deg) : 76.58  
 PA of pole (deg) : 52.87  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.355  
 C/A sky separation (km) : 17759.4  
 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\_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	2033-01-05T13:17:43.075		31.02	-31.04	50839.53	-21.45		
lambda	I	2033-01-05T13:18:20.930		31.01	-31.07	50026.71	-21.45		
delta	I	2033-01-05T13:19:41.644		30.98	-31.14	48300.35	-21.33		
gamma	I	2033-01-05T13:20:13.148		30.97	-31.16	47629.14	-21.28		
eta	I	2033-01-05T13:20:34.452		30.96	-31.18	47176.12	-21.25		
beta	I	2033-01-05T13:21:45.770		30.94	-31.23	45664.53	-21.12		
alpha	I	2033-01-05T13:22:31.049		30.92	-31.27	44713.23	-21.03		
4	I	2033-01-05T13:24:11.284		30.88	-31.34	42610.21	-20.83		
5	I	2033-01-05T13:24:32.339		30.87	-31.36	42180.75	-20.78		
6	I	2033-01-05T13:24:49.300		30.86	-31.37	41821.63	-20.76		
Uranus	I	2033-01-05T13:38:51.317		30.40	-31.88	25017.12		-13.26	-13.87
Uranus	E	2033-01-05T14:05:26.385		29.05	-32.33	25543.68		2.18	2.28
6	E	2033-01-05T14:19:40.258		28.07	-32.29	41877.69	20.74		
5	E	2033-01-05T14:19:56.933		28.05	-32.29	42224.22	20.76		
4	E	2033-01-05T14:20:11.911		28.03	-32.28	42528.40	20.80		
alpha	E	2033-01-05T14:21:55.494		27.90	-32.26	44697.52	21.01		
beta	E	2033-01-05T14:22:40.499		27.84	-32.25	45644.52	21.09		
eta	E	2033-01-05T14:23:52.888		27.75	-32.24	47176.12	21.22		
gamma	E	2033-01-05T14:24:13.842		27.72	-32.23	47621.10	21.25		
delta	E	2033-01-05T14:24:45.766		27.68	-32.23	48300.35	21.30		
lambda	E	2033-01-05T14:26:06.591		27.57	-32.20	50026.71	21.42		
epsilon	E	2033-01-05T14:27:01.553		27.50	-32.19	51205.77	21.42		