

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-09-05T04:56:15.670
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3377578847267096064
 2Mass ID (if available) : 06220519+2334459

ICRS Star Coord at Epoch: 06h 22m 05.20466s +23:34:45.69323s

RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.383
 G magnitude : 16.850
 RP magnitude : 16.051
 BP magnitude : 17.536
 DUPflag : 0
 Distance (au) : 19.337
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 17.80
 Sun-Target sep (deg) : 67.44
 Sun-Moon sep (deg) : 164.22
 B (ring opening deg) : 70.90
 PA of pole (deg) : 67.20

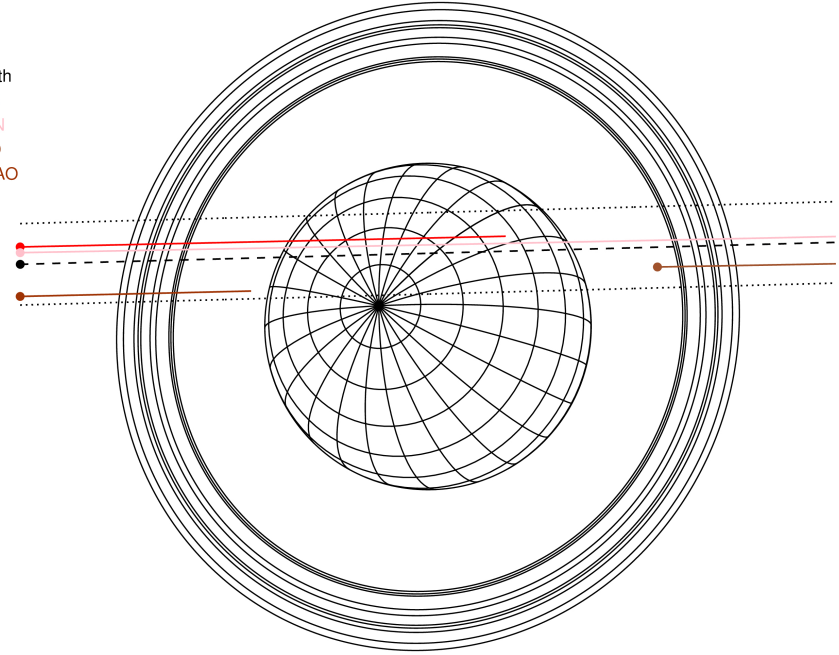
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2033-09-05T04:56:15.6700 ex: 06 22 05.2047 8: +23 34 45.693 C/A 0.821" PA 181.54 deg v_sky +17.80 km/s D 19.34 AU
 Credit: Styled after SORA/Lucky Star

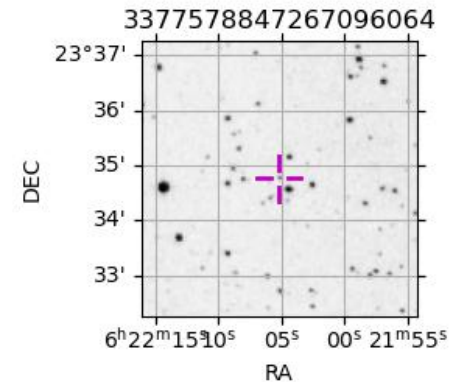
Uranus 2033-09-05T04:56:15 K14.38 G16.85 PgtRgt

Earth
 PIC
 TEN
 RIO
 SAAO

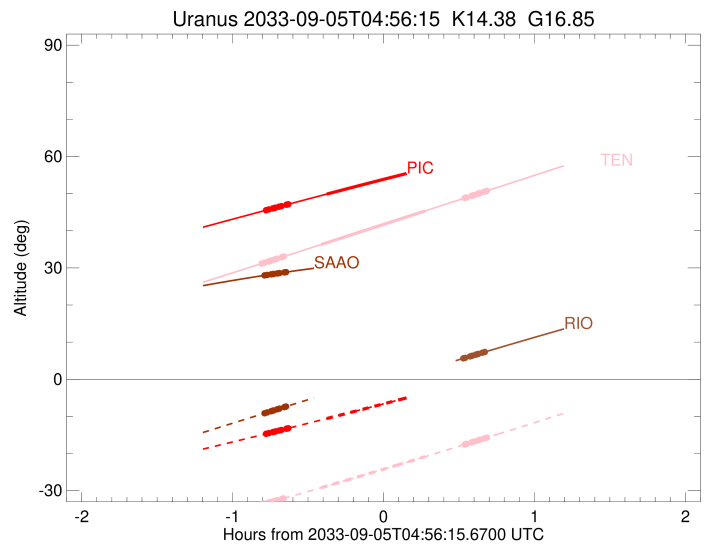
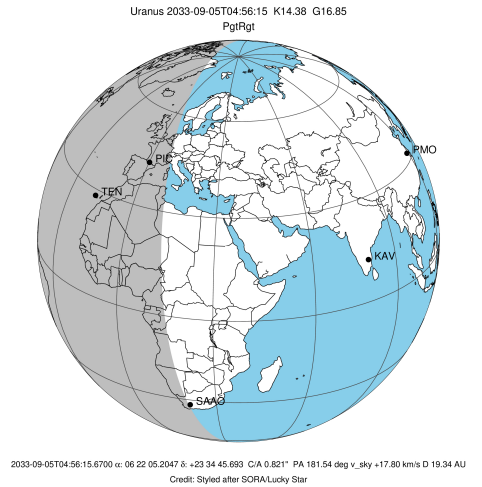


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++++	+		SEP 05 04:09 - SEP 05 04:33	PinRin
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					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5	+++++++	+ +	+++++++	SEP 05 04:07 - SEP 05 05:37	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			+++++++	SEP 05 05:27 - SEP 05 05:36	PnnRne
ESO	European Southern Obs	-29.3	289.3					PnnRnn
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++++			SEP 05 04:08 - SEP 05 04:17	PnnRin
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



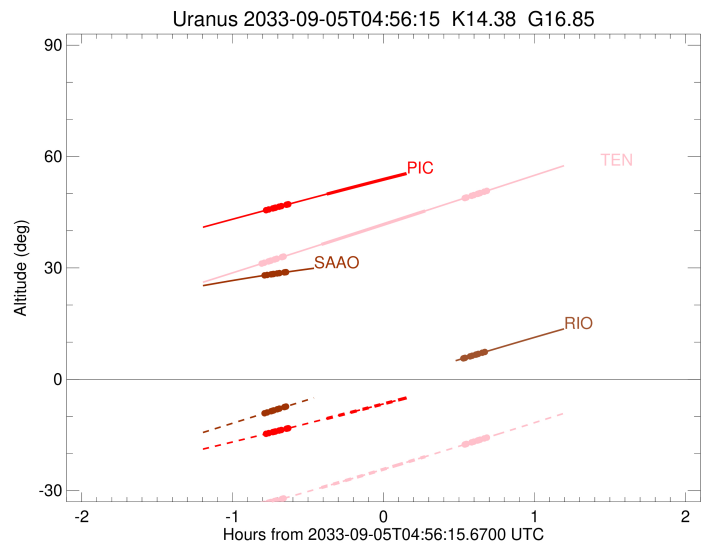
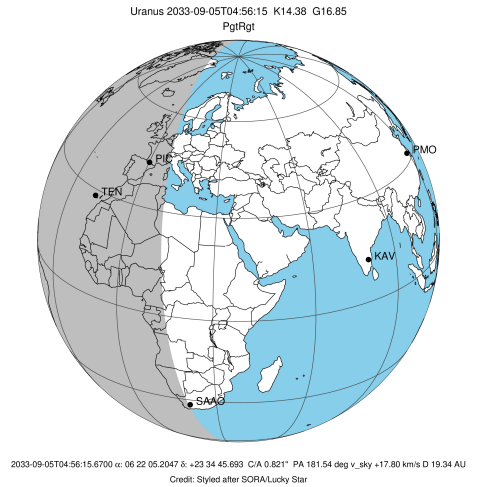
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-09-05T04:53:33.480
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3377578847267096064
 2Mass ID (if available) : 06220519+2334459
 ICRS Star Coord at Epoch: 06h 22m 05.20466s +23:34:45.69323s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.383
 G magnitude : 16.850
 RP magnitude : 16.051
 BP magnitude : 17.536
 DUPflag : 0
 Distance (au) : 19.337
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 17.80
 Sun-Target sep (deg) : 67.44
 Sun-Moon sep (deg) : 164.95
 B (ring opening deg) : 70.90
 PA of pole (deg) : 67.20
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.988
 C/A sky separation (km) : 13851.6
 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



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	2033-09-05T04:09:29.319		45.53	-14.70	51261.29	-17.79		
lambda	I	2033-09-05T04:10:38.950		45.74	-14.51	50026.71	-17.71		
delta	I	2033-09-05T04:12:16.578		46.03	-14.23	48300.35	-17.65		
gamma	I	2033-09-05T04:12:54.645		46.15	-14.13	47628.77	-17.63		
eta	I	2033-09-05T04:13:20.333		46.23	-14.06	47176.12	-17.61		
beta	I	2033-09-05T04:14:45.566		46.48	-13.82	45678.76	-17.55		
alpha	I	2033-09-05T04:15:39.841		46.65	-13.66	44721.64	-17.51		
4	I	2033-09-05T04:17:44.815		47.02	-13.31	42551.12	-17.41		
5	I	2033-09-05T04:18:04.879		47.08	-13.25	42189.91	-17.40		
6	I	2033-09-05T04:18:22.430		47.14	-13.20	41878.54	-17.37		
Uranus	I	2033-09-05T04:33:44.162		49.89	-10.57	25050.15		18.83	19.65
Uranus	E	2033-09-05T05:13:48.482		56.84	-3.51x	25401.96		-10.22	-10.69
6	E	2033-09-05T05:29:49.005		59.46	-0.63x	41798.81	17.28		
5	E	2033-09-05T05:30:18.386		59.54	-0.54x	42311.62	17.31		
4	E	2033-09-05T05:30:32.858		59.57	-0.49x	42561.80	17.32		
alpha	E	2033-09-05T05:32:36.030		59.90	-0.12x	44695.94	17.41		
beta	E	2033-09-05T05:33:30.068		60.04	0.04x	45641.20	17.46		
eta	E	2033-09-05T05:34:57.898		60.27	0.31x	47176.12	17.51		
gamma	E	2033-09-05T05:35:23.622		60.34	0.38x	47626.82	17.53		
delta	E	2033-09-05T05:36:02.023		60.44	0.50x	48300.35	17.55		
lambda	E	2033-09-05T05:37:40.235		60.70	0.80x	50026.71	17.60		
epsilon	E	2033-09-05T05:38:49.818		60.88	1.01x	51252.86	17.68		

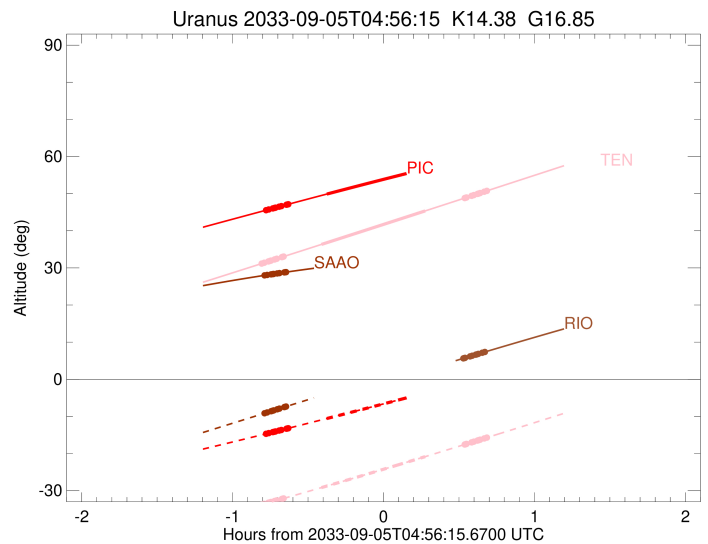
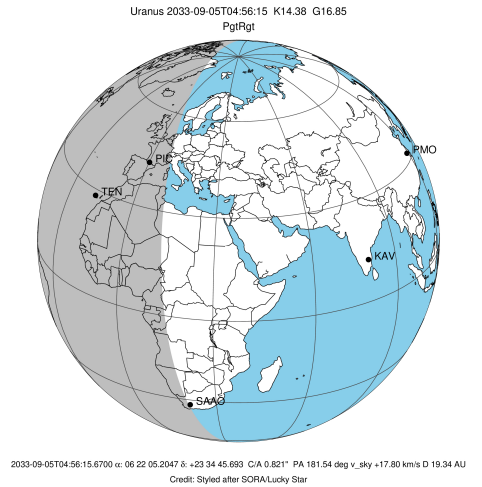
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-09-05T04:52:00.080
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3377578847267096064
 2Mass ID (if available) : 06220519+2334459
 ICRS Star Coord at Epoch: 06h 22m 05.20466s +23:34:45.69323s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.383
 G magnitude : 16.850
 RP magnitude : 16.051
 BP magnitude : 17.536
 DUPflag : 0
 Distance (au) : 19.337
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 17.80
 Sun-Target sep (deg) : 67.44
 Sun-Moon sep (deg) : 165.08
 B (ring opening deg) : 70.90
 PA of pole (deg) : 67.20
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.911
 C/A sky separation (km) : 12775.4
 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_itrf93_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	2033-09-05T04:07:44.687		31.15	-33.78	51253.75	-17.95		
lambda	I	2033-09-05T04:08:53.244		31.39	-33.57	50026.71	-17.88		
delta	I	2033-09-05T04:10:29.921		31.74	-33.26	48300.35	-17.83		
gamma	I	2033-09-05T04:11:07.611		31.88	-33.14	47628.67	-17.81		
eta	I	2033-09-05T04:11:33.031		31.97	-33.06	47176.12	-17.80		
beta	I	2033-09-05T04:12:57.355		32.28	-32.79	45678.97	-17.74		
alpha	I	2033-09-05T04:13:51.007		32.47	-32.62	44722.41	-17.70		
4	I	2033-09-05T04:15:54.523		32.92	-32.23	42552.11	-17.62		
5	I	2033-09-05T04:16:14.515		32.99	-32.16	42188.30	-17.61		
6	I	2033-09-05T04:16:31.746		33.05	-32.11	41878.77	-17.59		
Uranus	I	2033-09-05T04:31:35.381		36.32	-29.18	25043.40		18.96	19.79
Uranus	E	2033-09-05T05:12:49.327		45.35	-20.85	25376.32		-11.04	-11.55
6	E	2033-09-05T05:28:29.962		48.80	-17.58	41798.28	17.46		
5	E	2033-09-05T05:28:59.029		48.91	-17.48	42310.87	17.48		
4	E	2033-09-05T05:29:13.453		48.96	-17.43	42563.12	17.49		
alpha	E	2033-09-05T05:31:15.481		49.41	-17.00	44696.67	17.57		
beta	E	2033-09-05T05:32:09.006		49.61	-16.81	45641.14	17.60		
eta	E	2033-09-05T05:33:36.137		49.93	-16.51	47176.12	17.65		
gamma	E	2033-09-05T05:34:01.656		50.02	-16.42	47626.68	17.66		
delta	E	2033-09-05T05:34:39.778		50.16	-16.29	48300.35	17.68		
lambda	E	2033-09-05T05:36:17.295		50.52	-15.94	50026.71	17.72		
epsilon	E	2033-09-05T05:37:25.867		50.77	-15.70	51243.09	17.79		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-09-05T04:50:58.010
 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 : 3377578847267096064
 2Mass ID (if available) : 06220519+2334459
 ICRS Star Coord at Epoch: 06h 22m 05.20466s +23:34:45.69323s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.383
 G magnitude : 16.850
 RP magnitude : 16.051
 BP magnitude : 17.536
 DUPflag : 0
 Distance (au) : 19.337
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 17.80
 Sun-Target sep (deg) : 67.44
 Sun-Moon sep (deg) : 164.84
 B (ring opening deg) : 70.90
 PA of pole (deg) : 67.20
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.619
 C/A sky separation (km) : 8684.7
 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

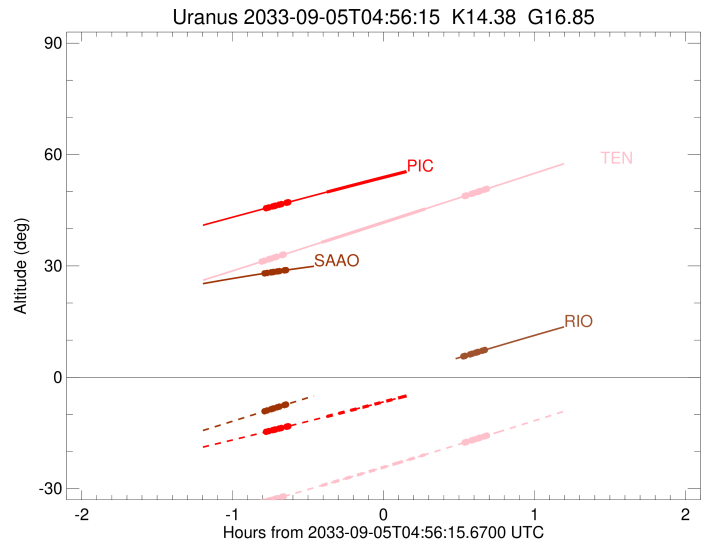
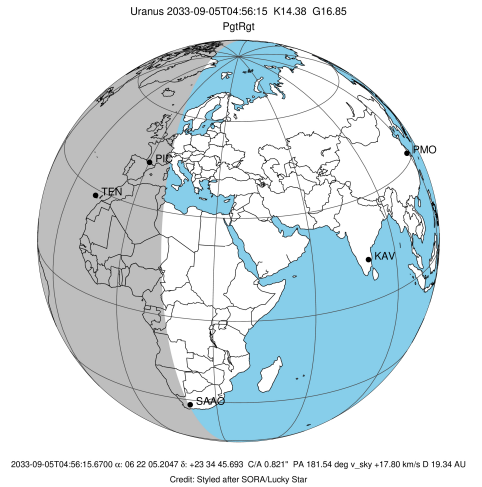


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-09-05T04:06:14.327	-11.56x	-65.90	51221.76	-18.46		
lambda	I	2033-09-05T04:07:19.191	-11.33x	-65.71	50026.71	-18.42		
delta	I	2033-09-05T04:08:52.999	-10.99x	-65.42	48300.35	-18.39		
gamma	I	2033-09-05T04:09:29.555	-10.86x	-65.31	47628.25	-18.38		
eta	I	2033-09-05T04:09:54.159	-10.77x	-65.24	47176.12	-18.37		
beta	I	2033-09-05T04:11:15.733	-10.48x	-64.99	45679.75	-18.35		
alpha	I	2033-09-05T04:12:07.478	-10.29x	-64.83	44725.54	-18.33		
4	I	2033-09-05T04:14:06.574	-9.86x	-64.46	42556.25	-18.28		
5	I	2033-09-05T04:14:26.500	-9.79x	-64.40	42182.06	-18.28		
6	I	2033-09-05T04:14:42.708	-9.73x	-64.35	41879.47	-18.27		
Uranus	I	2033-09-05T04:28:56.168	-6.69x	-61.59	25038.29		19.06	19.89
Uranus	E	2033-09-05T05:13:18.192	2.62x	-52.31	25283.65		-13.64	-14.26
6	E	2033-09-05T05:27:57.686	5.62	-49.10	41796.72	18.11		
5	E	2033-09-05T05:28:25.607	5.71	-49.00	42307.75	18.12		
4	E	2033-09-05T05:28:39.859	5.76	-48.94	42567.74	18.12		
alpha	E	2033-09-05T05:30:37.765	6.16	-48.51	44699.30	18.15		
beta	E	2033-09-05T05:31:29.417	6.33	-48.32	45641.06	18.17		
eta	E	2033-09-05T05:32:53.914	6.62	-48.01	47176.12	18.19		
gamma	E	2033-09-05T05:33:18.656	6.70	-47.91	47626.19	18.19		
delta	E	2033-09-05T05:33:55.703	6.83	-47.78	48300.35	18.20		
lambda	E	2033-09-05T05:35:30.504	7.15	-47.43	50026.71	18.22		
epsilon	E	2033-09-05T05:36:35.389	7.36	-47.19	51209.22	18.26		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2033-09-05T04:54:57.410
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        : 3377578847267096064
2Mass ID (if available) : 06220519+2334459
ICRS Star Coord at Epoch: 06h 22m 05.20466s +23:34:45.69323s
RUWE (>1.4 is poor) : 1.00
K magnitude           : 14.383
G magnitude           : 16.850
RP magnitude          : 16.051
BP magnitude          : 17.536
DUPflag              : 0
Distance (au)         : 19.337
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : 17.80
Sun-Target sep (deg)  : 67.44
Sun-Moon sep (deg)   : 164.25
B (ring opening deg) : 70.90
PA of pole (deg)     : 67.20
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.444
C/A sky separation (km) : 6230.4
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	2033-09-05T04:08:56.278		27.99	-9.16	51199.57	-18.20		
lambda	I	2033-09-05T04:10:00.804		28.10	-8.94	50026.71	-18.17		
delta	I	2033-09-05T04:11:35.835		28.26	-8.60	48300.35	-18.16		
gamma	I	2033-09-05T04:12:12.868		28.33	-8.47	47627.96	-18.15		
eta	I	2033-09-05T04:12:37.759		28.37	-8.38	47176.12	-18.15		
beta	I	2033-09-05T04:14:00.278		28.51	-8.09	45680.18	-18.14		
alpha	I	2033-09-05T04:14:52.529		28.60	-7.91	44727.60	-18.13		
4	I	2033-09-05T04:16:52.810		28.80	-7.48	42559.09	-18.11		
5	I	2033-09-05T04:17:13.372		28.83	-7.41	42178.20	-18.11		
6	I	2033-09-05T04:17:29.511		28.86	-7.36	41879.70	-18.10		
Uranus	I	2033-09-05T04:31:46.081		30.18	-4.34x	25051.11		18.81	19.63
Uranus	E	2033-09-05T05:18:21.165		33.26	5.41x	25235.58		-14.82	-15.49
6	E	2033-09-05T05:32:53.672		33.80	8.42x	41796.10	18.03		
5	E	2033-09-05T05:33:21.628		33.81	8.52x	42305.90	18.04		
4	E	2033-09-05T05:33:36.123		33.82	8.57x	42570.07	18.04		
alpha	E	2033-09-05T05:35:34.584		33.87	8.97x	44700.68	18.06		
beta	E	2033-09-05T05:36:26.429		33.90	9.15x	45641.08	18.07		
eta	E	2033-09-05T05:37:51.422		33.93	9.44x	47176.12	18.08		
gamma	E	2033-09-05T05:38:16.303		33.94	9.53x	47625.95	18.08		
delta	E	2033-09-05T05:38:53.597		33.96	9.65x	48300.35	18.09		
lambda	E	2033-09-05T05:40:29.027		33.99	9.98x	50026.71	18.10		
epsilon	E	2033-09-05T05:41:33.451		34.02	10.20x	51192.68	18.12		