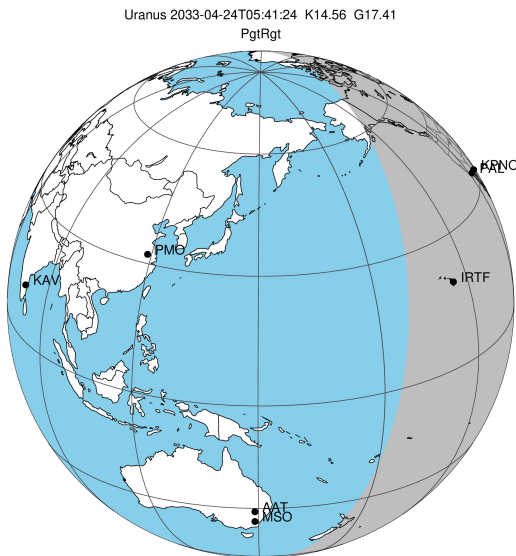


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-04-24T05:41:24.960
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427499664464391680
 2Mass ID (if available) : 05520327+2338284

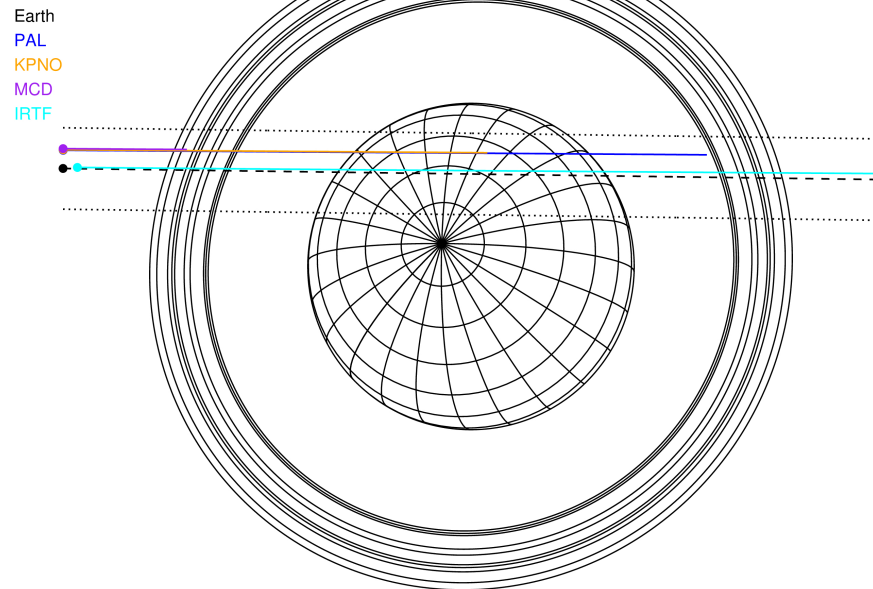
Uranus 2033-04-24T05:41:24 K14.56 G17.41 PgtRgt

ICRS Star Coord at Epoch: 05h 52m 03.27933s +23:38:28.42809s

RUWE (>1.4 is poor) : 0.95
 K magnitude : 14.562
 G magnitude : 17.408
 RP magnitude : 16.476
 BP magnitude : 18.302
 DUPflag : 0
 Distance (au) : 19.567
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.75
 Sun-Target sep (deg) : 54.27
 Sun-Moon sep (deg) : 121.36
 B (ring opening deg) : 76.84
 PA of pole (deg) : 51.91



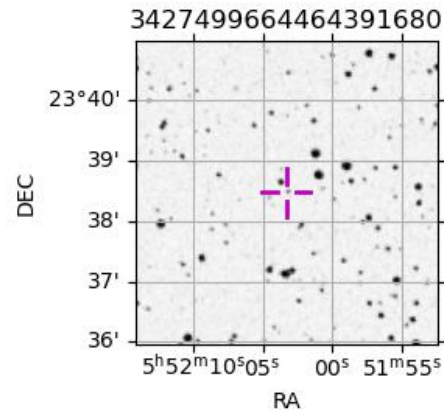
2033-04-24T05:41:24.9600 ex: 05 52 03.2793 s: +23 38 28.428 C/A 1.027° PA 179.22 deg v_sky +23.75 km/s D 19.57 AU
 Credit: Styled after SORA/Lucky Star



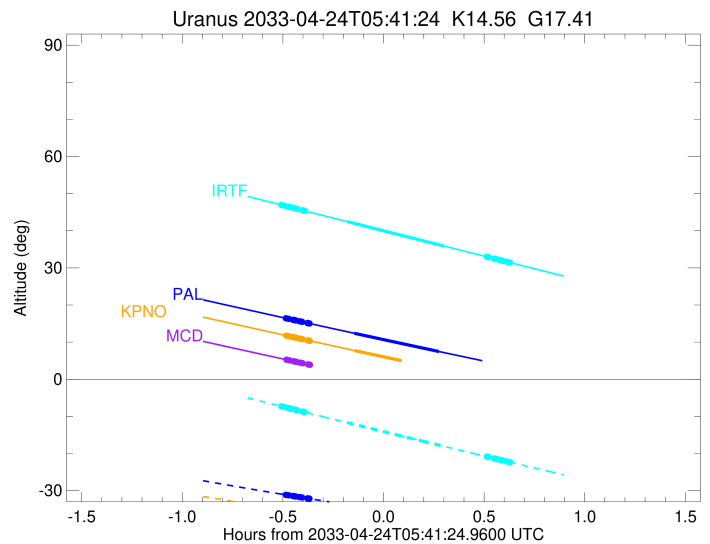
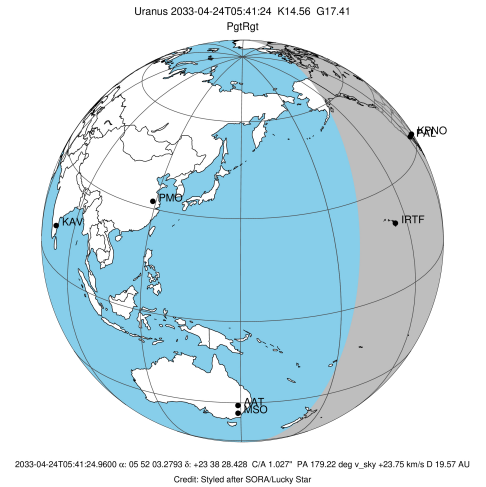
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	+++++	+ +		APR 24 05:12 - APR 24 05:57	PieRin
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+		APR 24 05:12 - APR 24 05:32	PinRin
MCD	McDonald Obs. 2.7m	30.7	256.0	++			APR 24 05:12 - APR 24 05:13	PnnRin
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	APR 24 05:11 - APR 24 06:18	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					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



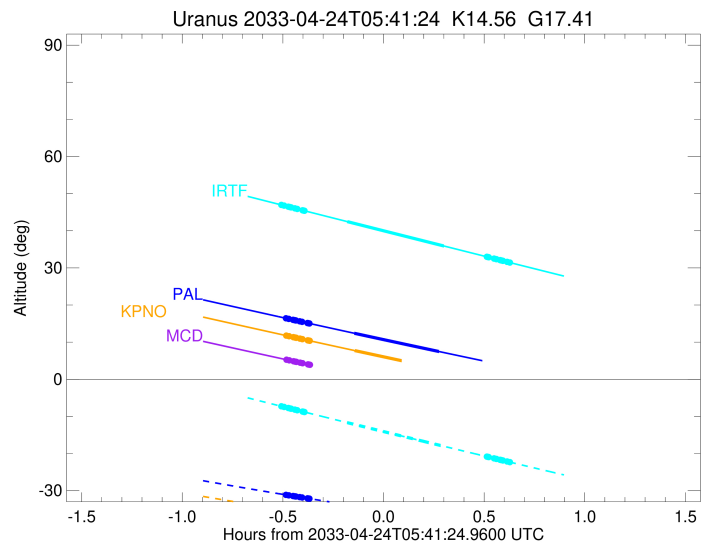
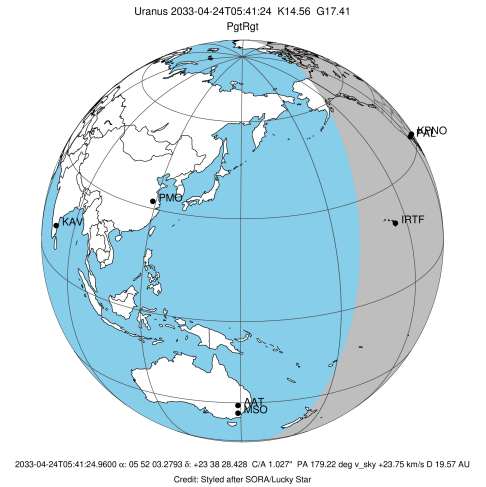
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-04-24T05:45:05.670
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3427499664464391680
 2Mass ID (if available) : 05520327+2338284
 ICRS Star Coord at Epoch: 05h 52m 03.27933s +23:38:28.42809s
 RUWE (>1.4 is poor) : 0.95
 K magnitude : 14.562
 G magnitude : 17.408
 RP magnitude : 16.476
 BP magnitude : 18.302
 DUPflag : 0
 Distance (au) : 19.567
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.75
 Sun-Target sep (deg) : 54.27
 Sun-Moon sep (deg) : 121.11
 B (ring opening deg) : 76.84
 PA of pole (deg) : 51.91
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.251
 C/A sky separation (km) : 17752.1
 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	2033-04-24T05:12:26.545		16.41	-31.16	51026.23	-22.50		
lambda	I	2033-04-24T05:13:10.905		16.26	-31.27	50026.71	-22.50		
delta	I	2033-04-24T05:14:27.832		16.01	-31.46	48300.35	-22.38		
gamma	I	2033-04-24T05:14:57.893		15.91	-31.53	47628.32	-22.33		
eta	I	2033-04-24T05:15:18.159		15.84	-31.58	47176.12	-22.30		
beta	I	2033-04-24T05:16:26.760		15.61	-31.74	45650.90	-22.16		
alpha	I	2033-04-24T05:17:10.265		15.47	-31.85	44687.52	-22.08		
4	I	2033-04-24T05:18:48.227		15.14	-32.09	42540.48	-21.86		
5	I	2033-04-24T05:19:03.547		15.09	-32.12	42197.83	-21.84		
6	I	2033-04-24T05:19:17.904		15.04	-32.16	41879.30	-21.78		
Uranus	I	2033-04-24T05:32:43.962		12.39	-34.02	25012.96		13.05	13.64
Uranus	E	2033-04-24T05:57:58.157		7.47	-37.19	25547.06		-1.88	-1.97
6	E	2033-04-24T06:11:24.586		4.90x	-38.67	41805.85	21.88		
5	E	2033-04-24T06:11:47.627		4.83x	-38.71	42313.39	21.94		
4	E	2033-04-24T06:11:59.196		4.79x	-38.73	42565.65	21.95		
alpha	E	2033-04-24T06:13:37.196		4.48x	-38.89	44729.46	22.18		
beta	E	2033-04-24T06:14:18.905		4.35x	-38.96	45655.76	22.27		
eta	E	2033-04-24T06:15:26.937		4.14x	-39.08	47176.12	22.41		
gamma	E	2033-04-24T06:15:46.792		4.07x	-39.11	47621.38	22.44		
delta	E	2033-04-24T06:16:17.008		3.98x	-39.16	48300.35	22.50		
lambda	E	2033-04-24T06:17:33.532		3.74x	-39.29	50026.71	22.62		
epsilon	E	2033-04-24T06:18:15.724		3.61x	-39.36	50982.47	22.62		

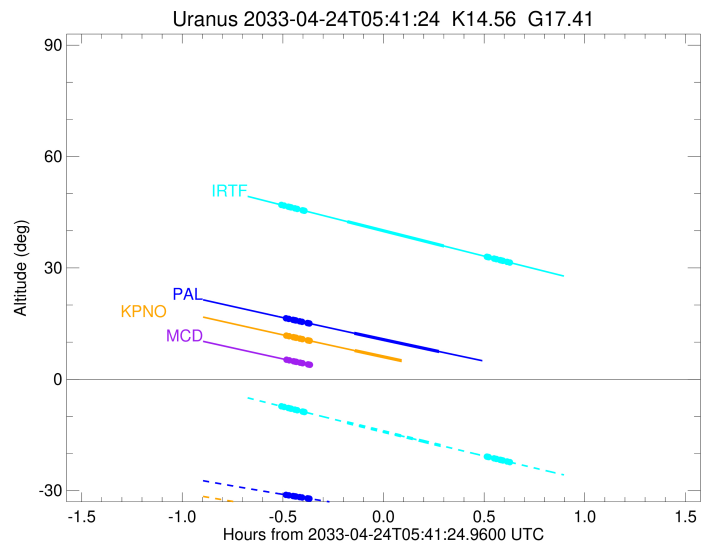
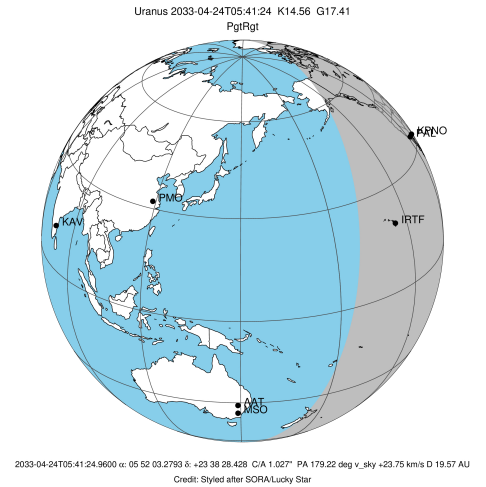
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-04-24T05:45:06.940
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      : 3427499664464391680
2Mass ID (if available) : 05520327+2338284
ICRS Star Coord at Epoch: 05h 52m 03.27933s +23:38:28.42809s
RUWE (>1.4 is poor) : 0.95
K magnitude         : 14.562
G magnitude         : 17.408
RP magnitude        : 16.476
BP magnitude        : 18.302
DUPflag            : 0
Distance (au)       : 19.567
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : 23.75
Sun-Target sep (deg) : 54.27
Sun-Moon sep (deg)  : 121.04
B (ring opening deg) : 76.84
PA of pole (deg)    : 51.91
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.257
C/A sky separation (km) : 17833.5
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl.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	2033-04-24T05:12:32.163		11.74	-35.20	51025.59	-22.52		
lambda	I	2033-04-24T05:13:16.458		11.59	-35.31	50026.71	-22.52		
delta	I	2033-04-24T05:14:33.324		11.34	-35.48	48300.35	-22.40		
gamma	I	2033-04-24T05:15:03.362		11.24	-35.55	47628.31	-22.35		
eta	I	2033-04-24T05:15:23.613		11.17	-35.59	47176.12	-22.31		
beta	I	2033-04-24T05:16:32.169		10.94	-35.75	45650.87	-22.18		
alpha	I	2033-04-24T05:17:15.645		10.80	-35.85	44687.50	-22.09		
4	I	2033-04-24T05:18:53.555		10.48	-36.07	42540.41	-21.87		
5	I	2033-04-24T05:19:08.856		10.43	-36.10	42197.98	-21.85		
6	I	2033-04-24T05:19:23.213		10.38	-36.13	41879.29	-21.79		
Uranus	I	2033-04-24T05:32:49.780		7.73	-37.85	25013.60		13.04	13.64
Uranus	E	2033-04-24T05:57:54.981		2.87x	-40.66	25547.77		-1.83	-1.91
6	E	2033-04-24T06:11:21.939		0.32x	-41.92	41805.91	21.89		
5	E	2033-04-24T06:11:44.969		0.25x	-41.95	42313.43	21.95		
4	E	2033-04-24T06:11:56.526		0.21x	-41.97	42565.55	21.96		
alpha	E	2033-04-24T06:13:34.471		-0.10x	-42.11	44729.40	22.20		
beta	E	2033-04-24T06:14:16.154		-0.23x	-42.17	45655.72	22.29		
eta	E	2033-04-24T06:15:24.140		-0.44x	-42.26	47176.12	22.42		
gamma	E	2033-04-24T06:15:43.980		-0.50x	-42.29	47621.38	22.46		
delta	E	2033-04-24T06:16:14.174		-0.60x	-42.33	48300.35	22.51		
lambda	E	2033-04-24T06:17:30.637		-0.83x	-42.44	50026.71	22.64		
epsilon	E	2033-04-24T06:18:12.764		-0.96x	-42.49	50981.83	22.64		

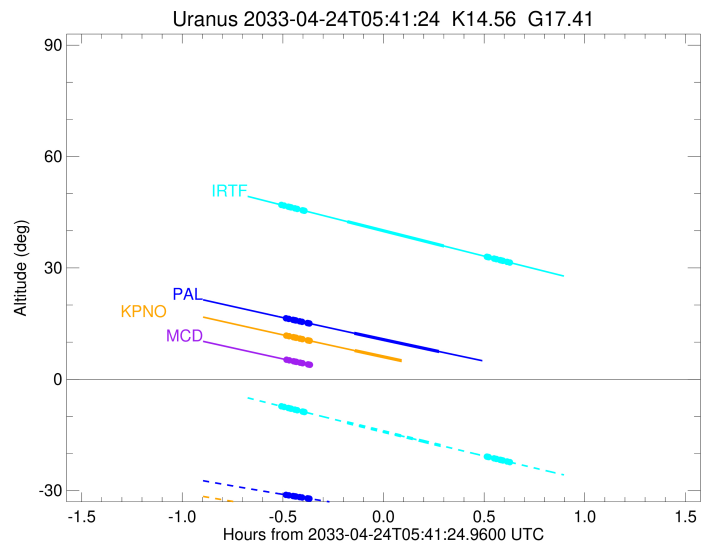
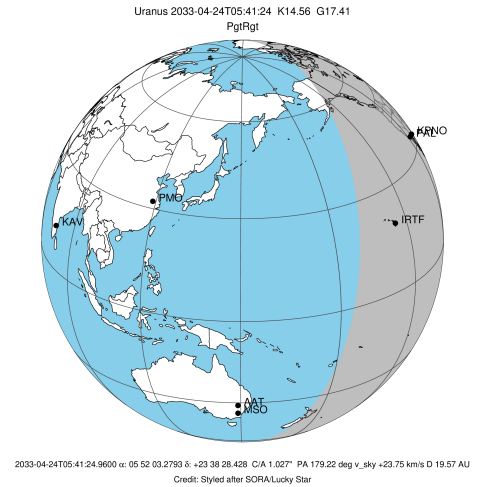
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-04-24T05:45:03.520
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 3427499664464391680
 2Mass ID (if available) : 05520327+2338284
 ICRS Star Coord at Epoch: 05h 52m 03.27933s +23:38:28.42809s
 RUWE (>1.4 is poor) : 0.95
 K magnitude : 14.562
 G magnitude : 17.408
 RP magnitude : 16.476
 BP magnitude : 18.302
 DUPflag : 0
 Distance (au) : 19.567
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.75
 Sun-Target sep (deg) : 54.27
 Sun-Moon sep (deg) : 120.96
 B (ring opening deg) : 76.84
 PA of pole (deg) : 51.91
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.269
 C/A sky separation (km) : 18010.4
 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	2033-04-24T05:12:36.079		5.25	-40.13	51024.13	-22.53		
lambda	I	2033-04-24T05:13:20.276		5.10	-40.22	50026.71	-22.53		
delta	I	2033-04-24T05:14:37.092		4.85x	-40.37	48300.35	-22.41		
gamma	I	2033-04-24T05:15:07.114		4.75x	-40.43	47628.29	-22.36		
eta	I	2033-04-24T05:15:27.353		4.68x	-40.46	47176.12	-22.32		
beta	I	2033-04-24T05:16:35.883		4.46x	-40.60	45650.79	-22.19		
alpha	I	2033-04-24T05:17:19.344		4.32x	-40.68	44687.44	-22.10		
4	I	2033-04-24T05:18:57.245		4.00x	-40.86	42540.26	-21.87		
5	I	2033-04-24T05:19:12.521		3.95x	-40.89	42198.32	-21.85		
6	I	2033-04-24T05:19:26.896		3.90x	-40.92	41879.26	-21.79		
Uranus	I	2033-04-24T05:32:55.499		1.29x	-42.33	25015.11		13.02	13.62
Uranus	E	2033-04-24T05:57:42.696		-3.42x	-44.45	25549.24		-1.70	-1.78
6	E	2033-04-24T06:11:11.794		-5.91x	-45.30	41806.04	21.89		
5	E	2033-04-24T06:11:34.825		-5.98x	-45.32	42313.50	21.95		
4	E	2033-04-24T06:11:46.372		-6.02x	-45.33	42565.35	21.96		
alpha	E	2033-04-24T06:13:24.312		-6.32x	-45.42	44729.26	22.20		
beta	E	2033-04-24T06:14:05.988		-6.44x	-45.46	45655.64	22.29		
eta	E	2033-04-24T06:15:13.954		-6.65x	-45.52	47176.12	22.43		
gamma	E	2033-04-24T06:15:33.786		-6.71x	-45.53	47621.37	22.47		
delta	E	2033-04-24T06:16:03.965		-6.80x	-45.56	48300.35	22.53		
lambda	E	2033-04-24T06:17:20.385		-7.03x	-45.62	50026.71	22.65		
epsilon	E	2033-04-24T06:18:02.427		-7.16x	-45.65	50980.51	22.66		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-04-24T05:44:48.060
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      : 3427499664464391680
2Mass ID (if available) : 05520327+2338284
ICRS Star Coord at Epoch: 05h 52m 03.27933s +23:38:28.42809s
RUWE (>1.4 is poor) : 0.95
K magnitude          : 14.562
G magnitude          : 17.408
RP magnitude         : 16.476
BP magnitude         : 18.302
DUPflag             : 0
Distance (au)       : 19.567
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : 23.75
Sun-Target sep (deg) : 54.27
Sun-Moon sep (deg)  : 121.52
B (ring opening deg) : 76.84
PA of pole (deg)    : 51.91
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.058
C/A sky separation (km) : 15013.2
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl.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	2033-04-24T05:11:02.597		46.95	-7.29	51048.25	-22.70		
lambda	I	2033-04-24T05:11:47.538		46.78	-7.46	50026.71	-22.71		
delta	I	2033-04-24T05:13:03.697		46.49	-7.75	48300.35	-22.63		
gamma	I	2033-04-24T05:13:33.408		46.37	-7.86	47628.61	-22.59		
eta	I	2033-04-24T05:13:53.448		46.30	-7.94	47176.12	-22.57		
beta	I	2033-04-24T05:15:01.111		46.04	-8.19	45652.03	-22.48		
alpha	I	2033-04-24T05:15:44.005		45.87	-8.35	44688.50	-22.42		
4	I	2033-04-24T05:17:20.252		45.51	-8.71	42542.87	-22.26		
5	I	2033-04-24T05:17:35.659		45.45	-8.77	42192.93	-22.26		
6	I	2033-04-24T05:17:49.500		45.40	-8.82	41879.63	-22.22		
Uranus	I	2033-04-24T05:30:36.608		42.47	-11.68	25003.82		13.16	13.76
Uranus	E	2033-04-24T05:59:25.525		35.90	-18.05	25513.95		-3.66	-3.84
6	E	2033-04-24T06:12:12.155		33.00	-20.83	41803.86	22.31		
5	E	2033-04-24T06:12:34.764		32.91	-20.92	42311.96	22.35		
4	E	2033-04-24T06:12:46.314		32.87	-20.96	42568.85	22.36		
alpha	E	2033-04-24T06:14:22.664		32.51	-21.30	44731.58	22.52		
beta	E	2033-04-24T06:15:03.739		32.35	-21.45	45657.03	22.58		
eta	E	2033-04-24T06:16:10.844		32.10	-21.69	47176.12	22.68		
gamma	E	2033-04-24T06:16:30.474		32.02	-21.76	47621.52	22.70		
delta	E	2033-04-24T06:17:00.351		31.91	-21.87	48300.35	22.74		
lambda	E	2033-04-24T06:18:16.124		31.62	-22.14	50026.71	22.83		
epsilon	E	2033-04-24T06:18:58.896		31.46	-22.30	51004.03	22.82		