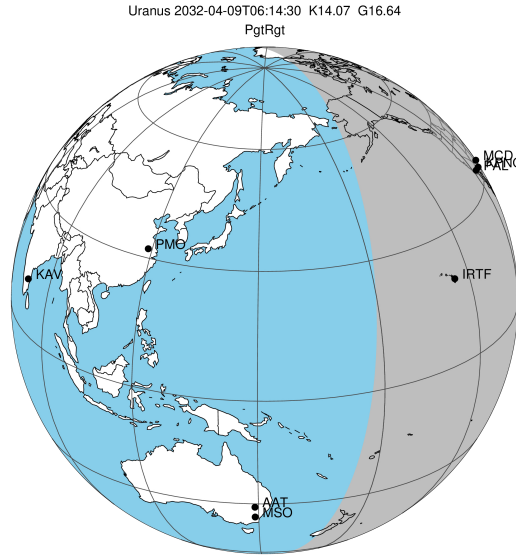


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-04-09T06:14:30.690  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3416173453449943168  
 2Mass ID (if available) : 05311738+2326014

ICRS Star Coord at Epoch: 05h 31m 17.38466s +23:26:01.30517s

RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.075  
 G magnitude : 16.639  
 RP magnitude : 15.844  
 BP magnitude : 17.279  
 DUPflag : 0  
 Distance (au) : 19.485  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 19.44  
 Sun-Target sep (deg) : 63.91  
 Sun-Moon sep (deg) : 75.25  
 B (ring opening deg) : 80.24  
 PA of pole (deg) : 33.16

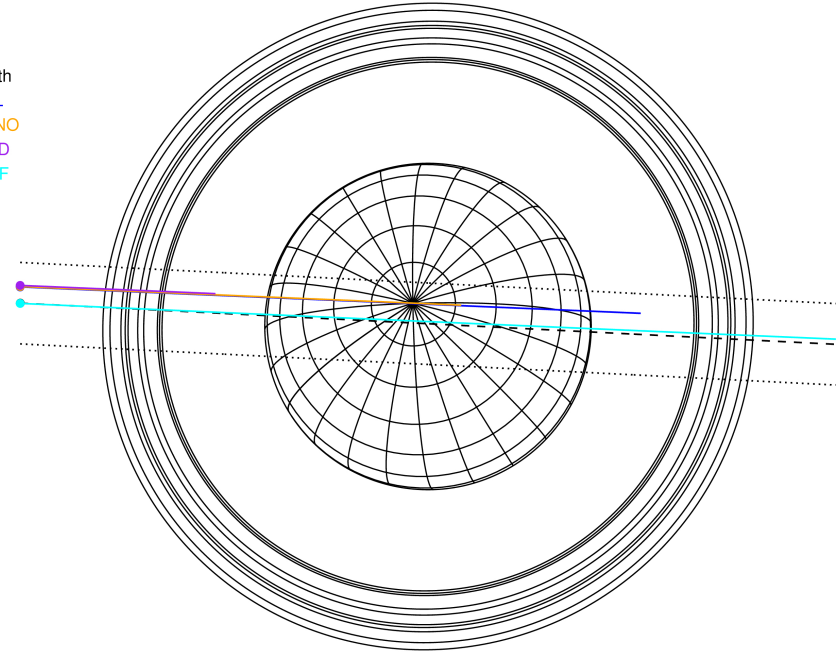
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2032-04-09T06:14:30.6900 ex: 05 31 17.3847 8: +23 26 01.305 C/A 0.036° PA 177.07 deg v\_sky +19.44 km/s D 19.49 AU  
 Credit: Styled after SORA/Lucky Star

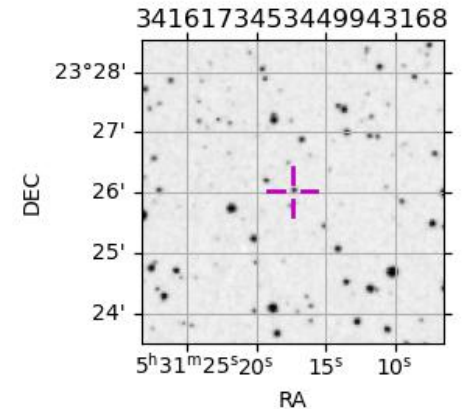
Uranus 2032-04-09T06:14:30 K14.07 G16.64 PgtRgt

Earth  
 PAL  
 KPNO  
 MCD  
 IRTF

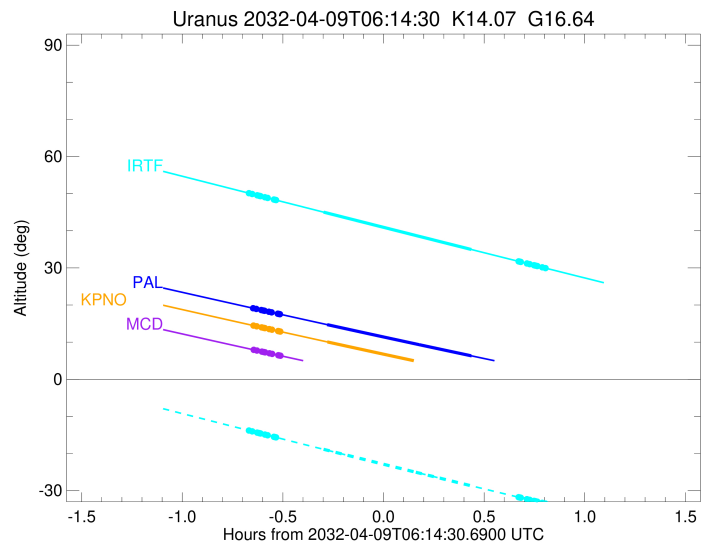
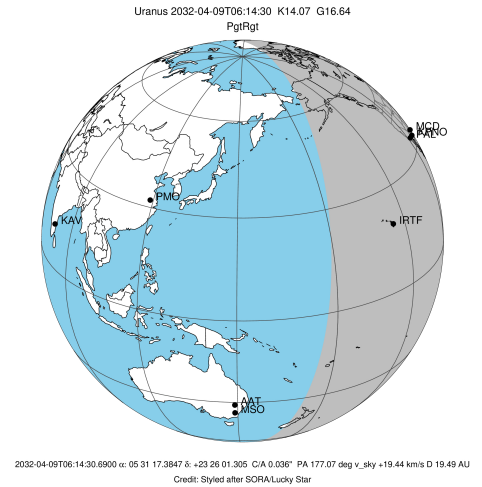


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 09 05:35 - APR 09 06:40	PieRin
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+		APR 09 05:35 - APR 09 05:57	PinRin
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++			APR 09 05:35 - APR 09 05:43	PnnRin
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	APR 09 05:34 - APR 09 07:02	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

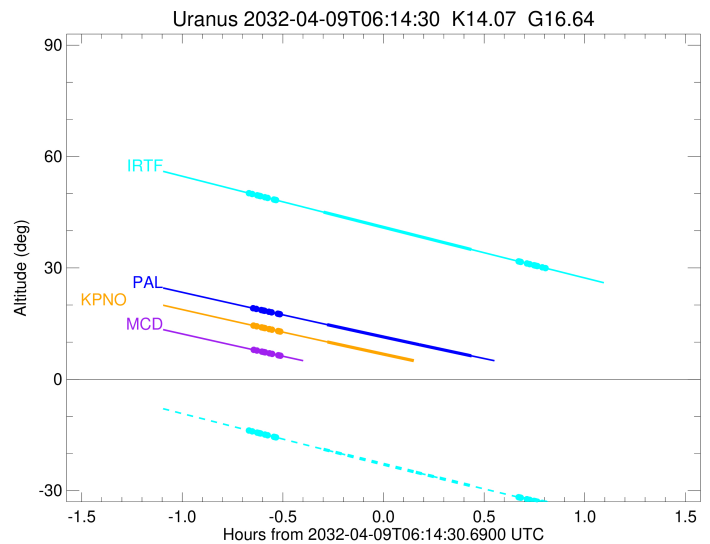
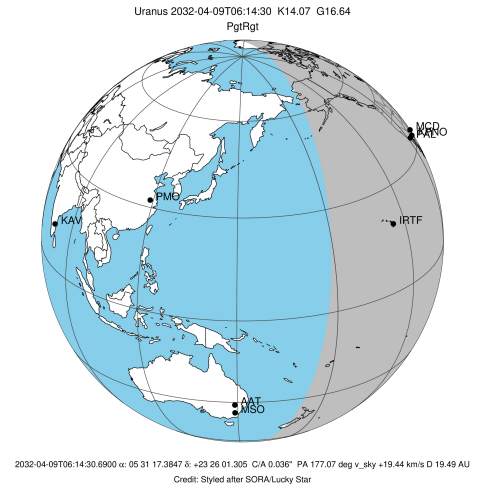


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-04-09T06:19:10.980  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3416173453449943168  
 2Mass ID (if available) : 05311738+2326014  
 ICRS Star Coord at Epoch: 05h 31m 17.38466s +23:26:01.30517s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.075  
 G magnitude : 16.639  
 RP magnitude : 15.844  
 BP magnitude : 17.279  
 DUPflag : 0  
 Distance (au) : 19.485  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 19.44  
 Sun-Target sep (deg) : 63.91  
 Sun-Moon sep (deg) : 75.65  
 B (ring opening deg) : 80.24  
 PA of pole (deg) : 33.16  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.246  
 C/A sky separation (km) : 3477.5  
 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



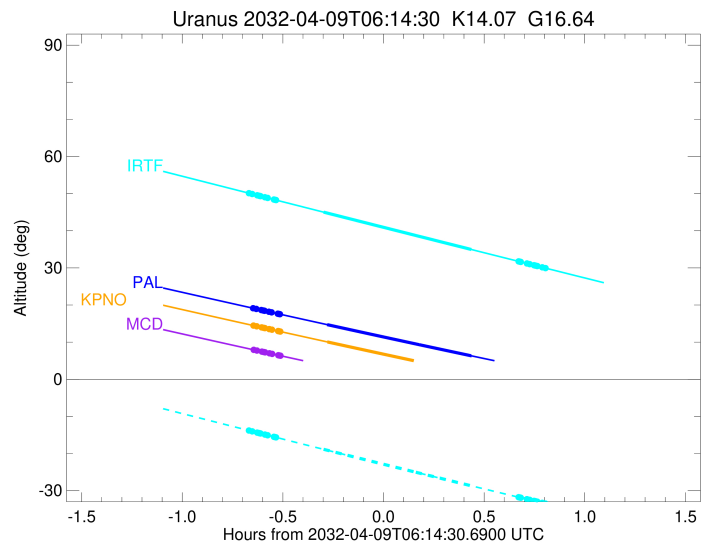
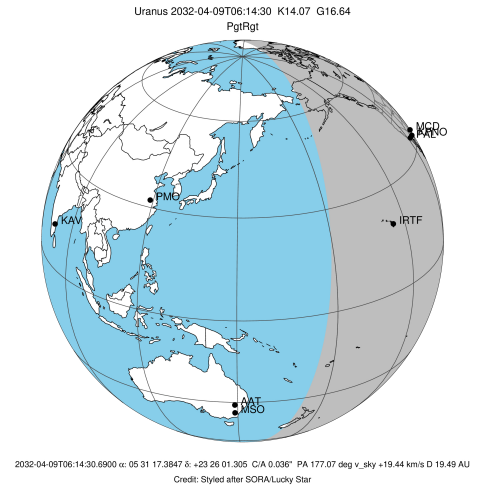
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-04-09T05:35:30.691		19.16	-38.20	51301.63	-19.42		
lambda	I	2032-04-09T05:36:36.364		18.94	-38.36	50026.71	-19.41		
delta	I	2032-04-09T05:38:05.295		18.64	-38.57	48300.35	-19.41		
gamma	I	2032-04-09T05:38:40.087		18.53	-38.65	47625.00	-19.41		
eta	I	2032-04-09T05:39:03.211		18.45	-38.71	47176.12	-19.41		
beta	I	2032-04-09T05:40:20.612		18.19	-38.89	45674.00	-19.41		
alpha	I	2032-04-09T05:41:08.198		18.03	-39.00	44748.87	-19.41		
4	I	2032-04-09T05:43:02.482		17.65	-39.27	42530.25	-19.40		
5	I	2032-04-09T05:43:16.827		17.60	-39.30	42258.19	-19.41		
6	I	2032-04-09T05:43:36.200		17.53	-39.35	41877.63	-19.40		
Uranus	I	2032-04-09T05:57:42.283		14.72	-41.24	25284.62		6.70	7.01
Uranus	E	2032-04-09T06:40:44.465		6.31	-45.92	25432.50		-4.52	-4.74
6	E	2032-04-09T06:54:38.606		3.66x	-47.02	41795.23	19.55		
5	E	2032-04-09T06:55:00.401		3.59x	-47.05	42224.46	19.55		
4	E	2032-04-09T06:55:20.645		3.53x	-47.07	42614.83	19.55		
alpha	E	2032-04-09T06:57:06.526		3.20x	-47.19	44686.20	19.56		
beta	E	2032-04-09T06:57:55.530		3.04x	-47.25	45646.09	19.57		
eta	E	2032-04-09T06:59:13.724		2.80x	-47.34	47176.12	19.57		
gamma	E	2032-04-09T06:59:36.748		2.73x	-47.36	47626.77	19.57		
delta	E	2032-04-09T07:00:11.157		2.62x	-47.40	48300.35	19.58		
lambda	E	2032-04-09T07:01:39.324		2.34x	-47.49	50026.71	19.58		
epsilon	E	2032-04-09T07:02:31.249		2.18x	-47.55	51043.70	19.60		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-04-09T06:19:13.040  
 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 : 3416173453449943168  
 2Mass ID (if available) : 05311738+2326014  
 ICRS Star Coord at Epoch: 05h 31m 17.38466s +23:26:01.30517s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.075  
 G magnitude : 16.639  
 RP magnitude : 15.844  
 BP magnitude : 17.279  
 DUPflag : 0  
 Distance (au) : 19.485  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 19.44  
 Sun-Target sep (deg) : 63.91  
 Sun-Moon sep (deg) : 75.58  
 B (ring opening deg) : 80.24  
 PA of pole (deg) : 33.16  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.252  
 C/A sky separation (km) : 3555.6  
 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	2032-04-09T05:35:37.890		14.49	-42.20	51302.14	-19.46		
lambda	I	2032-04-09T05:36:43.478		14.27	-42.34	50026.71	-19.45		
delta	I	2032-04-09T05:38:12.258		13.97	-42.54	48300.35	-19.44		
gamma	I	2032-04-09T05:38:46.991		13.85	-42.61	47624.99	-19.44		
eta	I	2032-04-09T05:39:10.076		13.77	-42.66	47176.12	-19.44		
beta	I	2032-04-09T05:40:27.347		13.52	-42.83	45673.98	-19.44		
alpha	I	2032-04-09T05:41:14.853		13.36	-42.93	44748.84	-19.44		
4	I	2032-04-09T05:43:08.942		12.97	-43.18	42530.28	-19.44		
5	I	2032-04-09T05:43:23.259		12.93	-43.21	42258.32	-19.44		
6	I	2032-04-09T05:43:42.607		12.86	-43.25	41877.61	-19.44		
Uranus	I	2032-04-09T05:57:47.391		10.05	-44.94	25282.94		6.72	7.04
Uranus	E	2032-04-09T06:40:43.637		1.70x	-48.83	25434.02		-4.50	-4.71
6	E	2032-04-09T06:54:36.422		-0.91x	-49.61	41795.21	19.58		
5	E	2032-04-09T06:54:58.190		-0.98x	-49.62	42224.62	19.59		
4	E	2032-04-09T06:55:18.392		-1.05x	-49.64	42614.86	19.58		
alpha	E	2032-04-09T06:57:04.091		-1.37x	-49.72	44686.18	19.59		
beta	E	2032-04-09T06:57:53.011		-1.53x	-49.75	45646.06	19.60		
eta	E	2032-04-09T06:59:11.071		-1.77x	-49.81	47176.12	19.61		
gamma	E	2032-04-09T06:59:34.055		-1.84x	-49.82	47626.76	19.61		
delta	E	2032-04-09T07:00:08.405		-1.95x	-49.84	48300.35	19.61		
lambda	E	2032-04-09T07:01:36.420		-2.22x	-49.90	50026.71	19.62		
epsilon	E	2032-04-09T07:02:28.286		-2.38x	-49.93	51044.33	19.63		

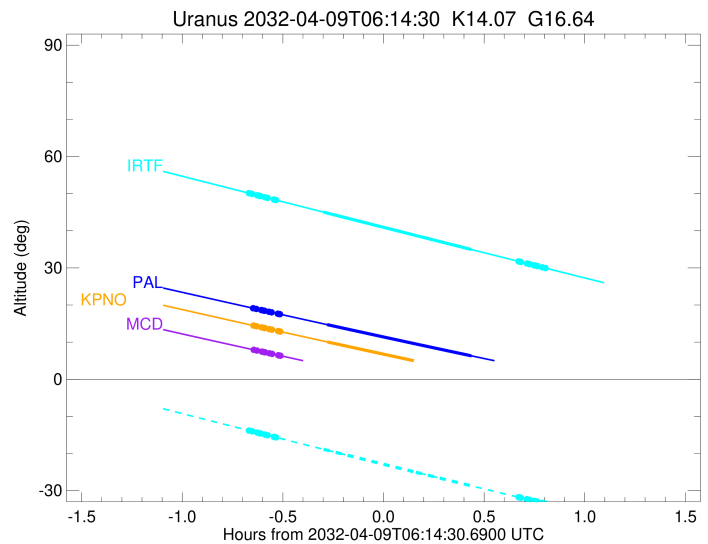
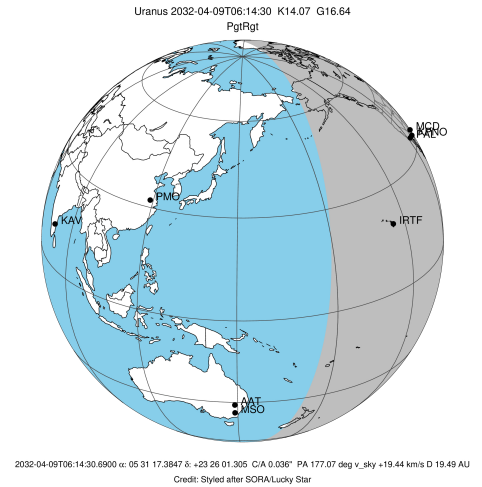
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-04-09T06:19:09.610  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 3416173453449943168  
 2Mass ID (if available) : 05311738+2326014  
 ICRS Star Coord at Epoch: 05h 31m 17.38466s +23:26:01.30517s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.075  
 G magnitude : 16.639  
 RP magnitude : 15.844  
 BP magnitude : 17.279  
 DUPflag : 0  
 Distance (au) : 19.485  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 19.44  
 Sun-Target sep (deg) : 63.91  
 Sun-Moon sep (deg) : 75.47  
 B (ring opening deg) : 80.24  
 PA of pole (deg) : 33.16  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.264  
 C/A sky separation (km) : 3733.0  
 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	2032-04-09T05:35:42.226		7.95	-46.96	51303.42	-19.50		
lambda	I	2032-04-09T05:36:47.720		7.73	-47.08	50026.71	-19.49		
delta	I	2032-04-09T05:38:16.285		7.44	-47.24	48300.35	-19.49		
gamma	I	2032-04-09T05:38:50.935		7.33	-47.30	47624.97	-19.49		
eta	I	2032-04-09T05:39:13.964		7.25	-47.34	47176.12	-19.49		
beta	I	2032-04-09T05:40:31.053		6.99	-47.48	45673.92	-19.49		
alpha	I	2032-04-09T05:41:18.445		6.84	-47.56	44748.78	-19.49		
4	I	2032-04-09T05:43:12.259		6.46	-47.75	42530.36	-19.48		
5	I	2032-04-09T05:43:26.531		6.41	-47.78	42258.64	-19.49		
6	I	2032-04-09T05:43:45.851		6.35	-47.81	41877.55	-19.48		
Uranus	I	2032-04-09T05:57:48.952		3.59x	-49.10	25278.91		6.77	7.09
Uranus	E	2032-04-09T06:40:35.632		-4.58x	-51.47	25437.32		-4.44	-4.64
6	E	2032-04-09T06:54:26.699		-7.12x	-51.68	41795.19	19.62		
5	E	2032-04-09T06:54:48.438		-7.19x	-51.68	42224.95	19.63		
4	E	2032-04-09T06:55:08.580		-7.25x	-51.68	42614.91	19.63		
alpha	E	2032-04-09T06:56:54.037		-7.57x	-51.68	44686.14	19.64		
beta	E	2032-04-09T06:57:42.846		-7.72x	-51.68	45646.01	19.64		
eta	E	2032-04-09T06:59:00.732		-7.95x	-51.68	47176.12	19.65		
gamma	E	2032-04-09T06:59:23.662		-8.02x	-51.68	47626.74	19.65		
delta	E	2032-04-09T06:59:57.934		-8.12x	-51.68	48300.35	19.66		
lambda	E	2032-04-09T07:01:25.747		-8.39x	-51.67	50026.71	19.66		
epsilon	E	2032-04-09T07:02:17.562		-8.54x	-51.67	51045.66	19.68		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2032-04-09T06:18:41.250
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       : 3416173453449943168
2Mass ID (if available) : 05311738+2326014
ICRS Star Coord at Epoch: 05h 31m 17.38466s +23:26:01.30517s
RUWE (>1.4 is poor) : 1.06
K magnitude          : 14.075
G magnitude          : 16.639
RP magnitude         : 15.844
BP magnitude         : 17.279
DUPflag             : 0
Distance (au)        : 19.485
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : 19.44
Sun-Target sep (deg) : 63.91
Sun-Moon sep (deg)   : 76.07
B (ring opening deg) : 80.24
PA of pole (deg)     : 33.16
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.054
C/A sky separation (km) : 769.9
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	2032-04-09T05:34:17.115		50.15	-13.78	51281.99	-19.19		
lambda	I	2032-04-09T05:35:22.519		49.90	-14.03	50026.71	-19.19		
delta	I	2032-04-09T05:36:52.461		49.56	-14.38	48300.35	-19.20		
gamma	I	2032-04-09T05:37:27.629		49.42	-14.51	47625.29	-19.20		
eta	I	2032-04-09T05:37:51.028		49.33	-14.60	47176.12	-19.20		
beta	I	2032-04-09T05:39:09.240		49.03	-14.90	45674.88	-19.20		
alpha	I	2032-04-09T05:39:57.356		48.85	-15.08	44749.71	-19.20		
4	I	2032-04-09T05:41:52.973		48.41	-15.52	42529.12	-19.20		
5	I	2032-04-09T05:42:07.652		48.35	-15.57	42253.30	-19.20		
6	I	2032-04-09T05:42:26.964		48.28	-15.65	41878.39	-19.20		
Uranus	I	2032-04-09T05:56:39.114		45.02	-18.87	25344.39		5.91	6.19
Uranus	E	2032-04-09T06:40:42.328		34.96	-28.70	25377.77		-5.42	-5.68
6	E	2032-04-09T06:54:44.839		31.77	-31.76	41795.74	19.33		
5	E	2032-04-09T06:55:06.549		31.69	-31.84	42219.27	19.34		
4	E	2032-04-09T06:55:27.261		31.61	-31.92	42613.93	19.34		
alpha	E	2032-04-09T06:57:14.413		31.20	-32.30	44686.89	19.34		
beta	E	2032-04-09T06:58:03.978		31.02	-32.48	45646.92	19.34		
eta	E	2032-04-09T06:59:23.036		30.72	-32.76	47176.12	19.35		
gamma	E	2032-04-09T06:59:46.345		30.63	-32.85	47627.08	19.35		
delta	E	2032-04-09T07:00:21.142		30.50	-32.97	48300.35	19.35		
lambda	E	2032-04-09T07:01:50.356		30.16	-33.29	50026.71	19.35		
epsilon	E	2032-04-09T07:02:41.815		29.97	-33.48	51022.62	19.36		