

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-11-30T10:10:50.180
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3377537611282799872
 2Mass ID (if available) : 06200891+2337334

Uranus 2033-11-30T10:10:50 K14.75 G17.64 PgtRgt

ICRS Star Coord at Epoch: 06h 20m 08.91680s +23:37:33.30106s

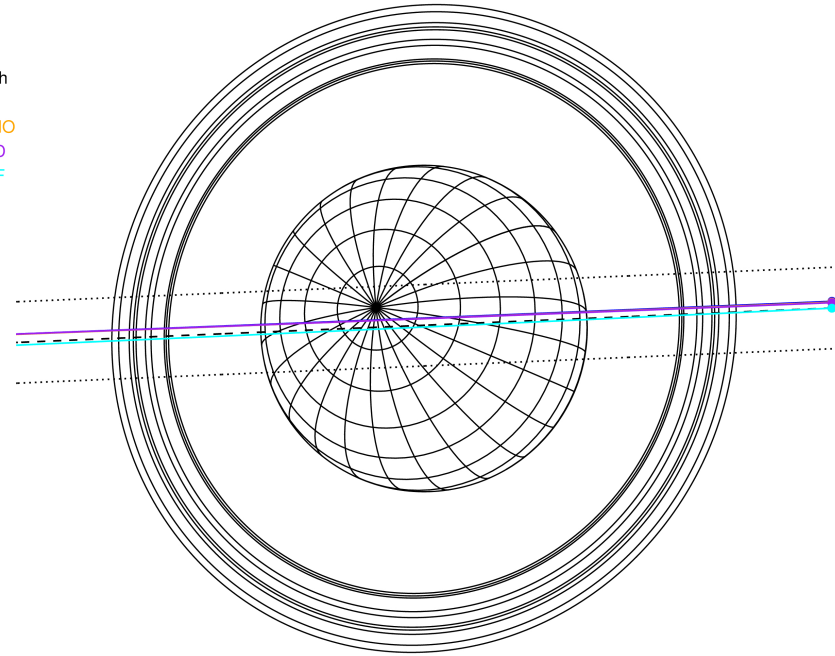
RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.748
 G magnitude : 17.642
 RP magnitude : 16.859
 BP magnitude : 18.331
 DUPflag : 0
 Distance (au) : 18.071
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.25
 Sun-Target sep (deg) : 153.43
 Sun-Moon sep (deg) : 106.41
 B (ring opening deg) : 71.29
 PA of pole (deg) : 66.37

#	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



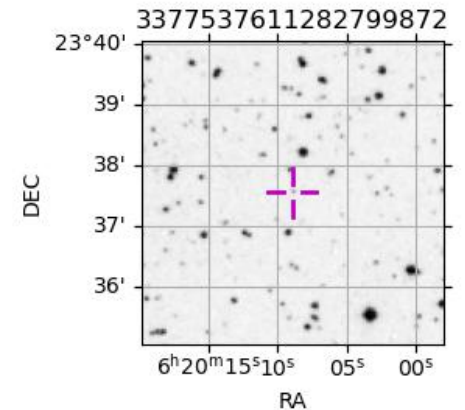
2033-11-30T10:10:50.1800 ex: 06 20 08.9168 s: +23 37 33.301 C/A 0.0477 PA 182.46 deg v_sky -20.25 km/s D 18.07 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PAL
 KPNO
 MCD
 IRTF

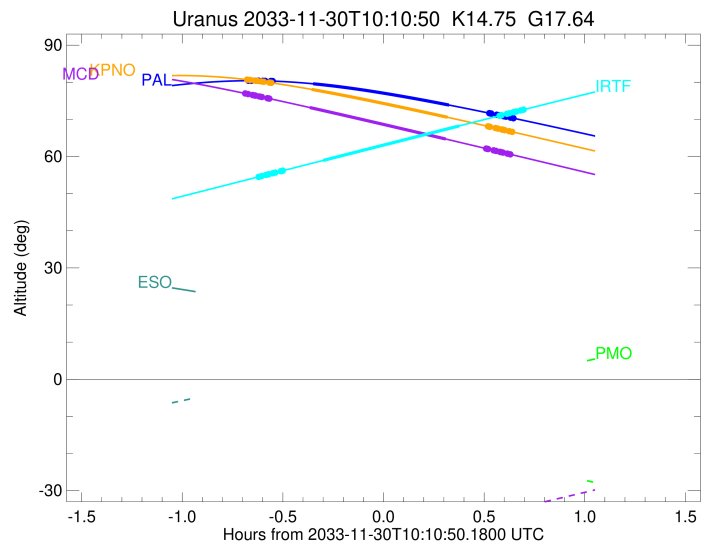
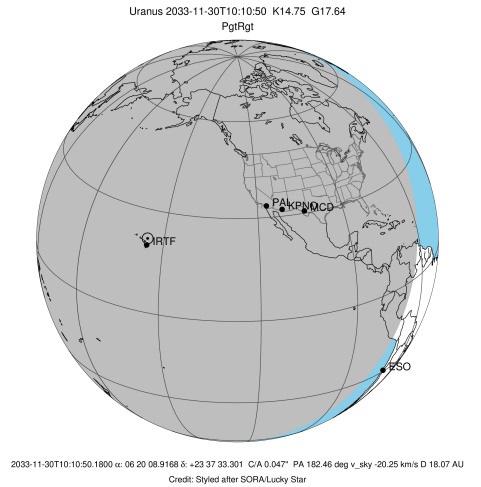


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++	+ +	+++++	NOV 30 09:30 - NOV 30 10:49	PieRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	NOV 30 09:30 - NOV 30 10:49	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	NOV 30 09:29 - NOV 30 10:48	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	NOV 30 09:33 - NOV 30 10:52	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					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



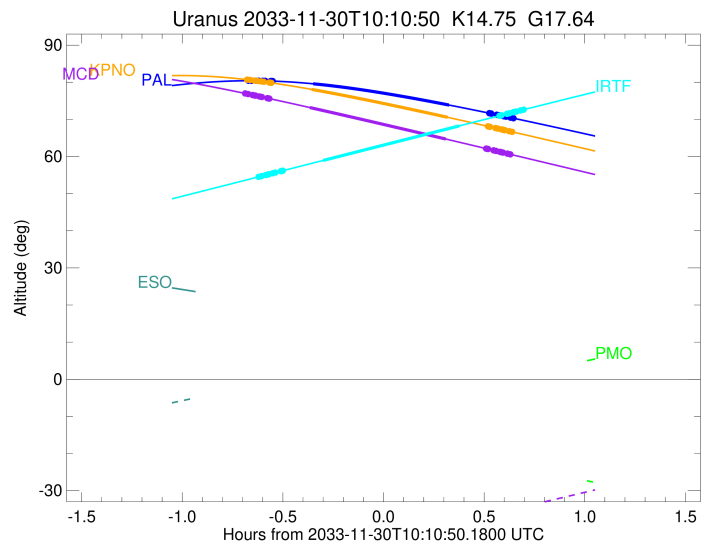
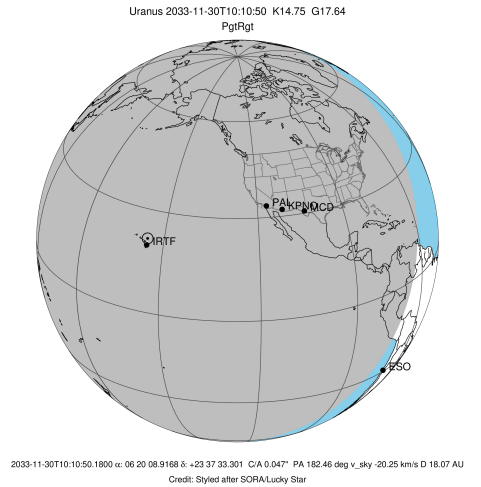
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-11-30T10:10:08.050
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3377537611282799872
 2Mass ID (if available) : 06200891+2337334
 ICRS Star Coord at Epoch: 06h 20m 08.91680s +23:37:33.30106s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.748
 G magnitude : 17.642
 RP magnitude : 16.859
 BP magnitude : 18.331
 DUPflag : 0
 Distance (au) : 18.071
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.25
 Sun-Target sep (deg) : 153.43
 Sun-Moon sep (deg) : 107.28
 B (ring opening deg) : 71.29
 PA of pole (deg) : 66.37
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.125
 C/A sky separation (km) : 1636.2
 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	2033-11-30T09:30:52.829		80.43	-62.21	50781.27	-21.55		
lambda	I	2033-11-30T09:31:27.837		80.43	-62.09	50026.71	-21.55		
delta	I	2033-11-30T09:32:47.935		80.42	-61.82	48300.35	-21.55		
gamma	I	2033-11-30T09:33:19.300		80.42	-61.72	47624.36	-21.55		
eta	I	2033-11-30T09:33:40.098		80.41	-61.65	47176.12	-21.55		
beta	I	2033-11-30T09:34:49.410		80.40	-61.42	45681.21	-21.55		
alpha	I	2033-11-30T09:35:33.770		80.38	-61.27	44729.21	-21.55		
4	I	2033-11-30T09:37:15.306		80.34	-60.93	42537.69	-21.55		
5	I	2033-11-30T09:37:29.352		80.33	-60.88	42225.70	-21.54		
6	I	2033-11-30T09:37:46.174		80.32	-60.82	41865.17	-21.54		
Uranus	I	2033-11-30T09:49:51.526		79.60	-58.37	25159.68		-16.18	-16.90
Uranus	E	2033-11-30T10:30:22.187		73.87	-50.00	25106.78		17.28	18.05
6	E	2033-11-30T10:42:21.262		71.69	-47.50	41811.99	21.53		
5	E	2033-11-30T10:42:41.128		71.62	-47.43	42237.56	21.53		
4	E	2033-11-30T10:42:57.889		71.57	-47.38	42607.11	21.54		
alpha	E	2033-11-30T10:44:35.326		71.27	-47.04	44710.28	21.54		
beta	E	2033-11-30T10:45:18.742		71.13	-46.89	45641.20	21.54		
eta	E	2033-11-30T10:46:29.939		70.91	-46.64	47176.12	21.54		
gamma	E	2033-11-30T10:46:50.907		70.84	-46.56	47627.82	21.54		
delta	E	2033-11-30T10:47:22.126		70.74	-46.46	48300.35	21.54		
lambda	E	2033-11-30T10:48:42.261		70.49	-46.18	50026.71	21.54		
epsilon	E	2033-11-30T10:49:50.824		70.27	-45.94	51503.81	21.54		

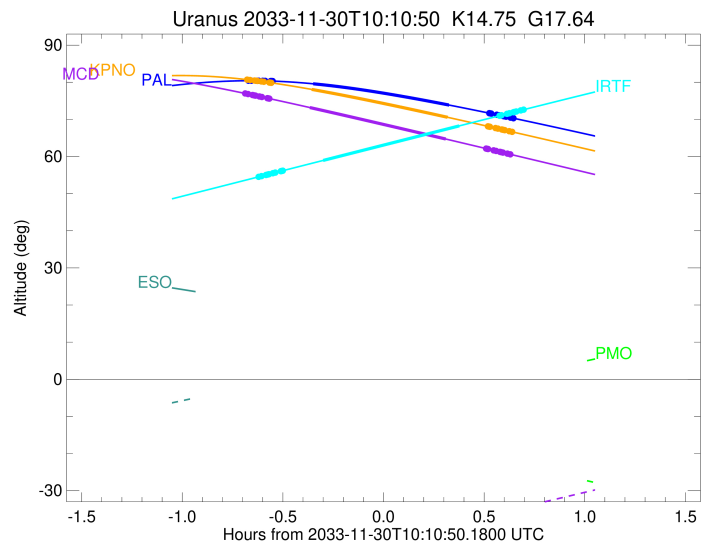
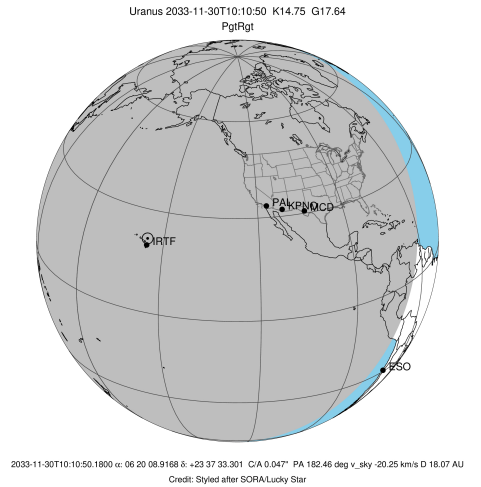
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-11-30T10:09:43.550
Event type          : PgtRgt
: 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      : 3377537611282799872
2Mass ID (if available) : 06200891+2337334
ICRS Star Coord at Epoch: 06h 20m 08.91680s +23:37:33.30106s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 14.748
G magnitude          : 17.642
RP magnitude         : 16.859
BP magnitude         : 18.331
DUPflag             : 0
Distance (au)       : 18.071
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -20.25
Sun-Target sep (deg) : 153.43
Sun-Moon sep (deg)  : 107.25
B (ring opening deg) : 71.29
PA of pole (deg)    : 66.37
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.118
C/A sky separation (km) : 1548.5
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.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	2033-11-30T09:30:28.514		80.68	-58.30	50781.69	-21.56		
lambda	I	2033-11-30T09:31:03.532		80.62	-58.17	50026.71	-21.56		
delta	I	2033-11-30T09:32:23.608		80.47	-57.89	48300.35	-21.56		
gamma	I	2033-11-30T09:32:54.964		80.41	-57.78	47624.37	-21.56		
eta	I	2033-11-30T09:33:15.757		80.37	-57.71	47176.12	-21.56		
beta	I	2033-11-30T09:34:25.052		80.23	-57.47	45681.21	-21.56		
alpha	I	2033-11-30T09:35:09.405		80.14	-57.32	44729.13	-21.56		
4	I	2033-11-30T09:36:50.914		79.93	-56.96	42537.61	-21.55		
5	I	2033-11-30T09:37:04.944		79.90	-56.91	42225.92	-21.55		
6	I	2033-11-30T09:37:21.776		79.86	-56.85	41865.08	-21.55		
Uranus	I	2033-11-30T09:49:26.803		78.08	-54.31	25157.82		-16.22	-16.95
Uranus	E	2033-11-30T10:29:58.231		70.57	-45.72	25107.79		17.26	18.02
6	E	2033-11-30T10:41:57.489		68.14	-43.18	41811.95	21.53		
5	E	2033-11-30T10:42:17.367		68.07	-43.11	42237.68	21.53		
4	E	2033-11-30T10:42:34.124		68.01	-43.05	42607.07	21.53		
alpha	E	2033-11-30T10:44:11.587		67.68	-42.70	44710.24	21.54		
beta	E	2033-11-30T10:44:55.017		67.53	-42.55	45641.20	21.53		
eta	E	2033-11-30T10:46:06.235		67.29	-42.30	47176.12	21.54		
gamma	E	2033-11-30T10:46:27.209		67.21	-42.22	47627.82	21.54		
delta	E	2033-11-30T10:46:58.437		67.11	-42.11	48300.35	21.54		
lambda	E	2033-11-30T10:48:18.597		66.83	-41.83	50026.71	21.54		
epsilon	E	2033-11-30T10:49:27.191		66.60	-41.59	51504.02	21.53		

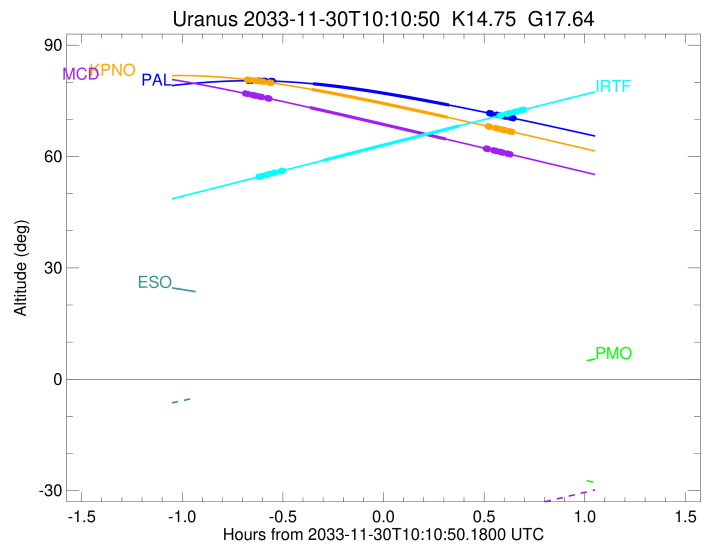
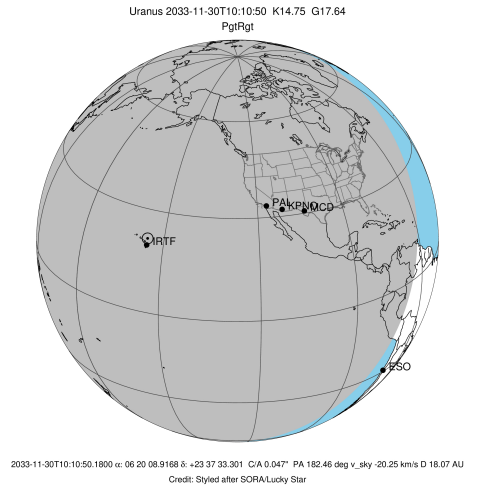
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-11-30T10:09:09.130
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 3377537611282799872
 2Mass ID (if available) : 06200891+2337334
 ICRS Star Coord at Epoch: 06h 20m 08.91680s +23:37:33.30106s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.748
 G magnitude : 17.642
 RP magnitude : 16.859
 BP magnitude : 18.331
 DUPflag : 0
 Distance (au) : 18.071
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.25
 Sun-Target sep (deg) : 153.43
 Sun-Moon sep (deg) : 107.19
 B (ring opening deg) : 71.29
 PA of pole (deg) : 66.37
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.117
 C/A sky separation (km) : 1530.3
 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	2033-11-30T09:29:53.293		76.94	-52.13	50781.91	-21.56		
lambda	I	2033-11-30T09:30:28.326		76.83	-52.00	50026.71	-21.56		
delta	I	2033-11-30T09:31:48.412		76.57	-51.71	48300.35	-21.56		
gamma	I	2033-11-30T09:32:19.773		76.47	-51.60	47624.37	-21.55		
eta	I	2033-11-30T09:32:40.569		76.40	-51.53	47176.12	-21.55		
beta	I	2033-11-30T09:33:49.875		76.18	-51.28	45681.21	-21.55		
alpha	I	2033-11-30T09:34:34.237		76.04	-51.12	44729.09	-21.55		
4	I	2033-11-30T09:36:15.763		75.71	-50.76	42537.57	-21.55		
5	I	2033-11-30T09:36:29.789		75.67	-50.71	42226.03	-21.54		
6	I	2033-11-30T09:36:46.632		75.61	-50.65	41865.03	-21.54		
Uranus	I	2033-11-30T09:48:51.777		73.20	-48.04	25157.07		-16.24	-16.96
Uranus	E	2033-11-30T10:29:24.719		64.72	-39.32	25107.72		17.26	18.03
6	E	2033-11-30T10:41:24.553		62.15	-36.75	41811.96	21.51		
5	E	2033-11-30T10:41:44.446		62.08	-36.68	42237.64	21.51		
4	E	2033-11-30T10:42:01.221		62.02	-36.62	42607.09	21.51		
alpha	E	2033-11-30T10:43:38.771		61.67	-36.27	44710.25	21.52		
beta	E	2033-11-30T10:44:22.240		61.51	-36.11	45641.20	21.52		
eta	E	2033-11-30T10:45:33.523		61.26	-35.86	47176.12	21.52		
gamma	E	2033-11-30T10:45:54.517		61.18	-35.78	47627.82	21.52		
delta	E	2033-11-30T10:46:25.774		61.07	-35.67	48300.35	21.52		
lambda	E	2033-11-30T10:47:46.009		60.78	-35.39	50026.71	21.52		
epsilon	E	2033-11-30T10:48:54.665		60.54	-35.14	51503.92	21.51		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2033-11-30T10:13:09.530
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        : 3377537611282799872
2Mass ID (if available) : 06200891+2337334
ICRS Star Coord at Epoch: 06h 20m 08.91680s +23:37:33.30106s
RUWE (>1.4 is poor)  : 0.99
K magnitude           : 14.748
G magnitude           : 17.642
RP magnitude          : 16.859
BP magnitude          : 18.331
DUPflag              : 0
Distance (au)         : 18.071
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -20.25
Sun-Target sep (deg)  : 153.43
Sun-Moon sep (deg)    : 107.37
B (ring opening deg)  : 71.29
PA of pole (deg)      : 66.37
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.017
C/A sky separation (km) : 226.2
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	2033-11-30T09:33:53.464		54.59	-81.19	50785.27	-21.52		
lambda	I	2033-11-30T09:34:28.711		54.73	-81.32	50026.71	-21.52		
delta	I	2033-11-30T09:35:48.926		55.04	-81.63	48300.35	-21.52		
gamma	I	2033-11-30T09:36:20.328		55.16	-81.75	47624.48	-21.52		
eta	I	2033-11-30T09:36:41.160		55.24	-81.82	47176.12	-21.52		
beta	I	2033-11-30T09:37:50.561		55.50	-82.09	45681.18	-21.52		
alpha	I	2033-11-30T09:38:35.018		55.67	-82.25	44728.35	-21.53		
4	I	2033-11-30T09:40:16.647		56.06	-82.63	42536.84	-21.53		
5	I	2033-11-30T09:40:30.573		56.12	-82.69	42227.99	-21.52		
6	I	2033-11-30T09:40:47.567		56.18	-82.75	41864.22	-21.52		
Uranus	I	2033-11-30T09:52:51.295		58.95	-85.39	25137.83		-16.64	-17.38
Uranus	E	2033-11-30T10:33:26.158		68.26	-84.29	25130.21		16.80	17.55
6	E	2033-11-30T10:45:24.876		70.99	-81.61	41810.68	21.59		
5	E	2033-11-30T10:45:44.882		71.06	-81.54	42240.66	21.59		
4	E	2033-11-30T10:46:01.382		71.13	-81.48	42606.02	21.60		
alpha	E	2033-11-30T10:47:38.560		71.50	-81.11	44709.08	21.60		
beta	E	2033-11-30T10:48:21.898		71.66	-80.94	45641.13	21.60		
eta	E	2033-11-30T10:49:32.899		71.93	-80.67	47176.12	21.60		
gamma	E	2033-11-30T10:49:53.815		72.01	-80.59	47627.99	21.60		
delta	E	2033-11-30T10:50:24.936		72.13	-80.48	48300.35	21.60		
lambda	E	2033-11-30T10:51:44.839		72.43	-80.17	50026.71	21.61		
epsilon	E	2033-11-30T10:52:53.492		72.69	-79.91	51510.12	21.61		