

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-01-25T08:17:12.560  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3413198248000757760  
 2Mass ID (if available) : 04521289+2233461

Uranus 2030-01-25T08:17:12 K10.24 G13.27 PgtRgt

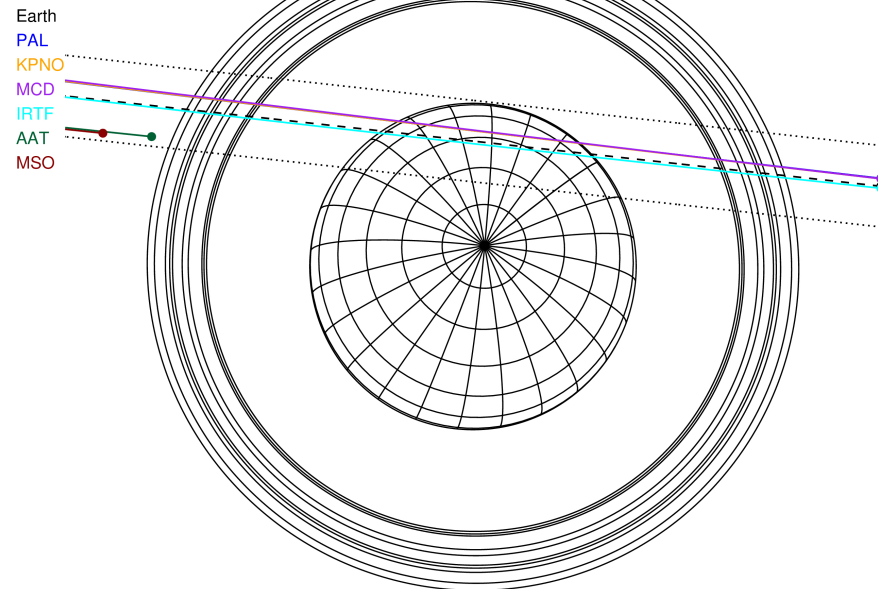
ICRS Star Coord at Epoch: 04h 52m 12.89939s +22:33:45.77275s

RUWE (>1.4 is poor) : 1.05  
 K magnitude : 10.236  
 G magnitude : 13.269  
 RP magnitude : 12.376  
 BP magnitude : 14.095  
 DUPflag : 0  
 Distance (au) : 18.575  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -12.59  
 Sun-Target sep (deg) : 129.41  
 Sun-Moon sep (deg) : 121.98  
 B (ring opening deg) : 81.59  
 PA of pole (deg) : -29.32

#	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

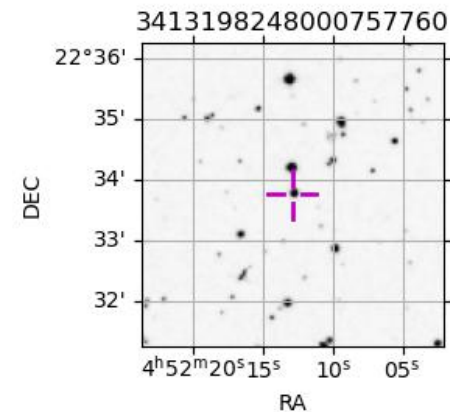


2030-01-25T08:17:12.5600 ra: 04 52 12.8994 d: +22 33 45.773 C/A 1.455 PA 173.69 deg v\_sky -12.59 km/s D 18.58 AU  
 Credit: Styled after SORA/Lucky Star

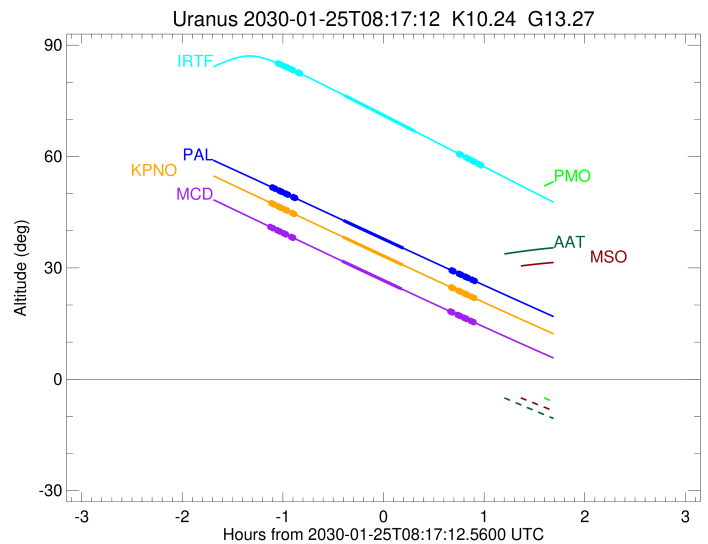
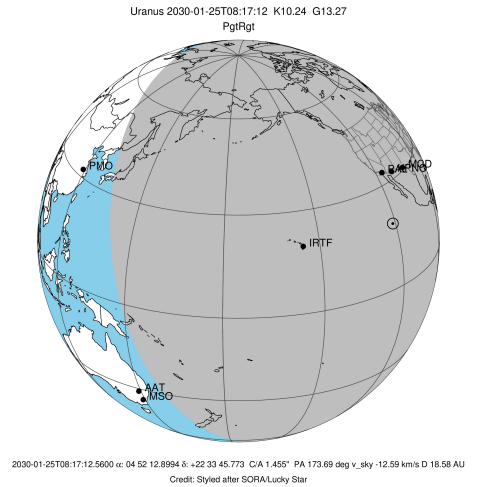


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 25 07:10 - JAN 25 09:11	PieRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	JAN 25 07:10 - JAN 25 09:11	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	JAN 25 07:09 - JAN 25 09:11	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	JAN 25 07:14 - JAN 25 09:15	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



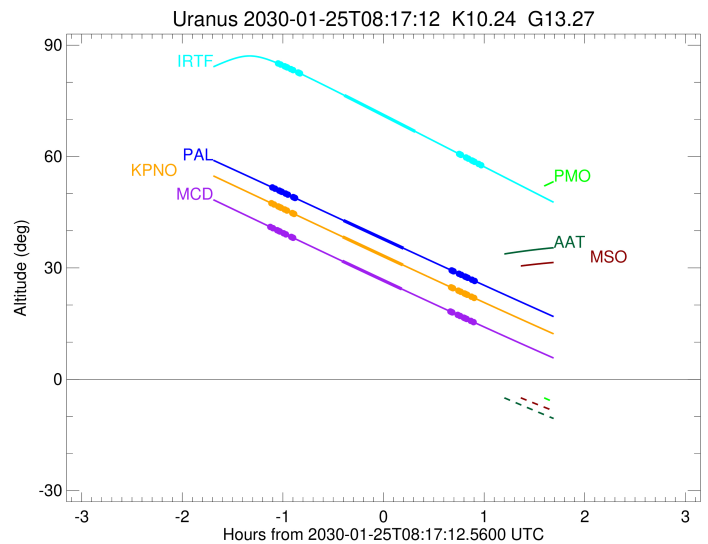
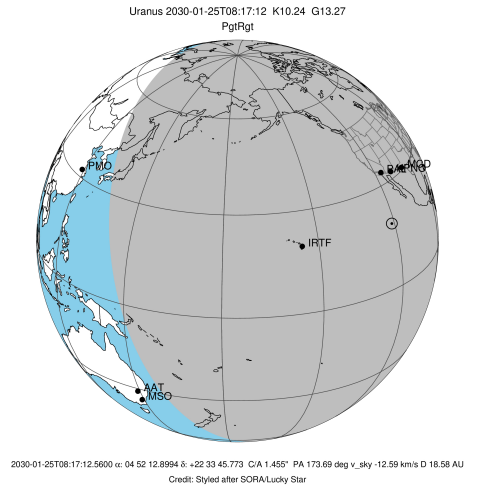
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-01-25T08:10:48.110  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3413198248000757760  
 2Mass ID (if available) : 04521289+2233461  
 ICRS Star Coord at Epoch: 04h 52m 12.89939s +22:33:45.77275s  
 RUWE (>1.4 is poor) : 1.05  
 K magnitude : 10.236  
 G magnitude : 13.269  
 RP magnitude : 12.376  
 BP magnitude : 14.095  
 DUPflag : 0  
 Distance (au) : 18.575  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -12.59  
 Sun-Target sep (deg) : 129.41  
 Sun-Moon sep (deg) : 122.87  
 B (ring opening deg) : 81.59  
 PA of pole (deg) : -29.32  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.569  
 C/A sky separation (km) : 21133.8  
 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	2030-01-25T07:10:43.553		51.72	-72.03	51305.75	-11.80		
lambda	I	2030-01-25T07:12:32.572		51.34	-72.27	50026.71	-11.70		
delta	I	2030-01-25T07:15:00.753		50.82	-72.59	48300.35	-11.60		
gamma	I	2030-01-25T07:15:58.856		50.62	-72.72	47627.52	-11.56		
eta	I	2030-01-25T07:16:37.957		50.48	-72.80	47176.12	-11.53		
beta	I	2030-01-25T07:18:48.188		50.03	-73.06	45681.19	-11.43		
alpha	I	2030-01-25T07:20:15.190		49.73	-73.24	44690.71	-11.35		
4	I	2030-01-25T07:23:21.270		49.08	-73.59	42594.14	-11.19		
5	I	2030-01-25T07:23:51.945		48.97	-73.65	42246.32	-11.16		
6	I	2030-01-25T07:24:29.980		48.84	-73.72	41829.90	-11.12		
Uranus	I	2030-01-25T07:53:27.885		42.76	-75.67	25001.50		8.29	8.68
Uranus	E	2030-01-25T08:29:04.610		35.30	-74.30	25376.86		4.67	4.90
6	E	2030-01-25T08:57:53.400		29.31	-70.70	41877.54	10.98		
5	E	2030-01-25T08:58:31.564		29.18	-70.60	42298.81	11.02		
4	E	2030-01-25T08:58:58.420		29.09	-70.53	42593.88	11.05		
alpha	E	2030-01-25T09:02:09.240		28.43	-70.04	44717.19	11.20		
beta	E	2030-01-25T09:03:32.314		28.14	-69.83	45651.01	11.27		
eta	E	2030-01-25T09:05:47.034		27.68	-69.47	47176.12	11.37		
gamma	E	2030-01-25T09:06:26.158		27.54	-69.36	47621.37	11.39		
delta	E	2030-01-25T09:07:25.650		27.34	-69.20	48300.35	11.43		
lambda	E	2030-01-25T09:09:56.060		26.82	-68.79	50026.71	11.52		
epsilon	E	2030-01-25T09:11:48.593		26.43	-68.48	51326.74	11.62		

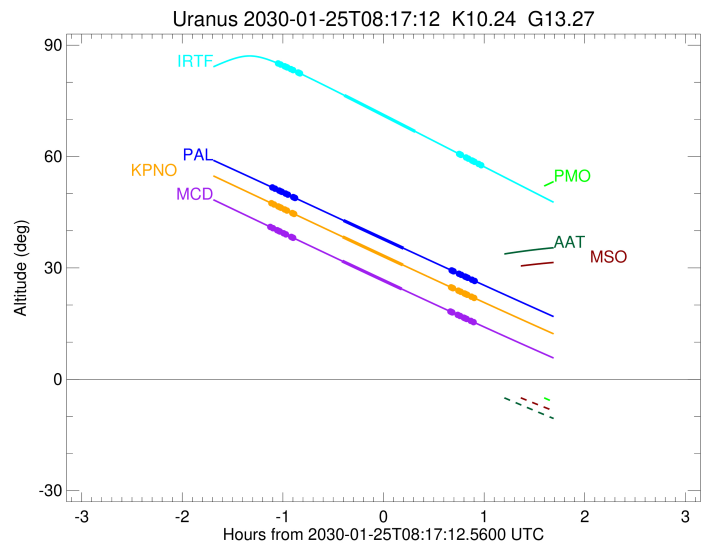
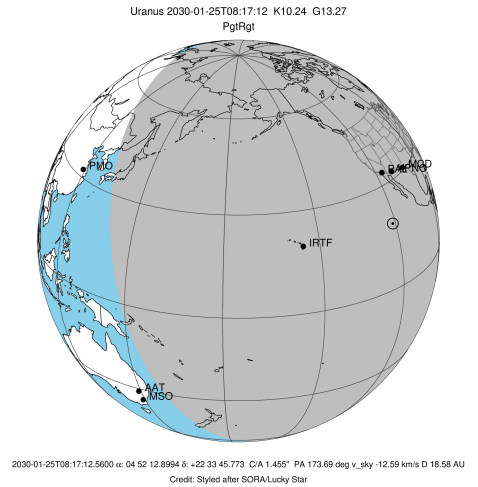
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-01-25T08:10:21.340
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       : 3413198248000757760
2Mass ID (if available) : 04521289+2233461
ICRS Star Coord at Epoch: 04h 52m 12.89939s +22:33:45.77275s
RUWE (>1.4 is poor) : 1.05
K magnitude           : 10.236
G magnitude           : 13.269
RP magnitude          : 12.376
BP magnitude          : 14.095
DUPflag              : 0
Distance (au)         : 18.575
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -12.59
Sun-Target sep (deg) : 129.41
Sun-Moon sep (deg)   : 122.84
B (ring opening deg) : 81.59
PA of pole (deg)     : -29.32
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.568
C/A sky separation (km) : 21124.0
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
    
```



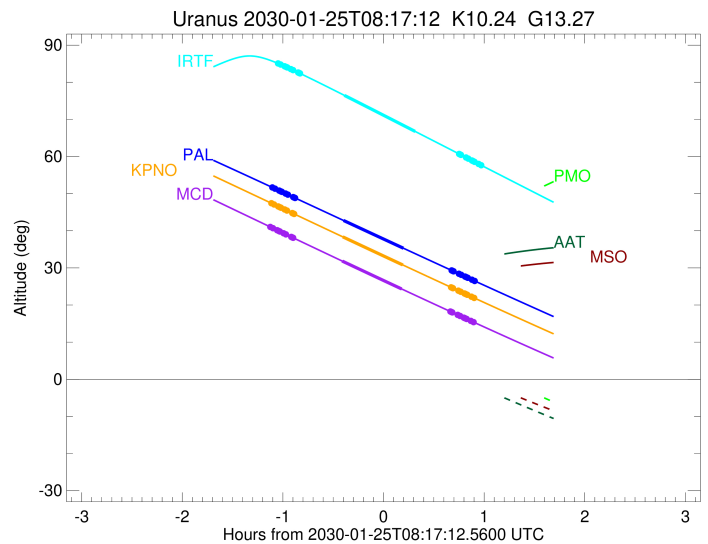
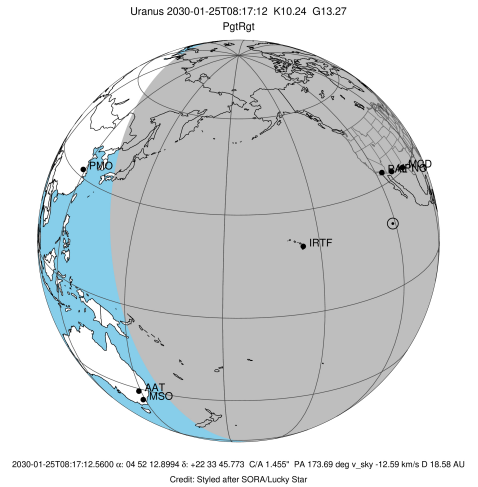
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-01-25T07:10:10.022		47.47	-75.63	51305.30	-11.79		
lambda	I	2030-01-25T07:11:59.154		47.08	-75.80	50026.71	-11.68		
delta	I	2030-01-25T07:14:27.543		46.55	-76.03	48300.35	-11.58		
gamma	I	2030-01-25T07:15:25.728		46.34	-76.11	47627.53	-11.54		
eta	I	2030-01-25T07:16:04.886		46.21	-76.17	47176.12	-11.51		
beta	I	2030-01-25T07:18:15.303		45.74	-76.34	45681.19	-11.41		
alpha	I	2030-01-25T07:19:42.428		45.43	-76.45	44690.74	-11.34		
4	I	2030-01-25T07:22:48.785		44.77	-76.65	42594.09	-11.17		
5	I	2030-01-25T07:23:19.509		44.66	-76.68	42246.22	-11.14		
6	I	2030-01-25T07:23:57.596		44.53	-76.72	41829.84	-11.10		
Uranus	I	2030-01-25T07:52:57.804		38.36	-76.73	25001.83		8.29	8.68
Uranus	E	2030-01-25T08:28:41.322		30.80	-72.90	25376.74		4.68	4.90
6	E	2030-01-25T08:57:33.461		24.76	-68.08	41877.55	10.96		
5	E	2030-01-25T08:58:11.715		24.63	-67.96	42298.84	11.00		
4	E	2030-01-25T08:58:38.632		24.53	-67.88	42593.91	11.02		
alpha	E	2030-01-25T09:01:49.892		23.87	-67.29	44717.17	11.18		
beta	E	2030-01-25T09:03:13.165		23.58	-67.03	45651.02	11.25		
eta	E	2030-01-25T09:05:28.205		23.11	-66.61	47176.12	11.34		
gamma	E	2030-01-25T09:06:07.422		22.98	-66.49	47621.37	11.37		
delta	E	2030-01-25T09:07:07.057		22.77	-66.30	48300.35	11.40		
lambda	E	2030-01-25T09:09:37.832		22.25	-65.83	50026.71	11.49		
epsilon	E	2030-01-25T09:11:30.660		21.86	-65.47	51326.97	11.59		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-01-25T08:09:50.030  
 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 : 3413198248000757760  
 2Mass ID (if available) : 04521289+2233461  
 ICRS Star Coord at Epoch: 04h 52m 12.89939s +22:33:45.77275s  
 RUWE (>1.4 is poor) : 1.05  
 K magnitude : 10.236  
 G magnitude : 13.269  
 RP magnitude : 12.376  
 BP magnitude : 14.095  
 DUPflag : 0  
 Distance (au) : 18.575  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -12.59  
 Sun-Target sep (deg) : 129.41  
 Sun-Moon sep (deg) : 122.79  
 B (ring opening deg) : 81.59  
 PA of pole (deg) : -29.32  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.574  
 C/A sky separation (km) : 21209.4  
 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	2030-01-25T07:09:30.547		41.08	-78.42	51305.51	-11.75		
lambda	I	2030-01-25T07:11:20.091		40.69	-78.40	50026.71	-11.64		
delta	I	2030-01-25T07:13:49.032		40.15	-78.36	48300.35	-11.54		
gamma	I	2030-01-25T07:14:47.439		39.94	-78.33	47627.53	-11.50		
eta	I	2030-01-25T07:15:26.747		39.80	-78.31	47176.12	-11.47		
beta	I	2030-01-25T07:17:37.675		39.33	-78.23	45681.19	-11.37		
alpha	I	2030-01-25T07:19:05.152		39.02	-78.17	44690.72	-11.29		
4	I	2030-01-25T07:22:12.280		38.35	-78.00	42594.13	-11.12		
5	I	2030-01-25T07:22:43.131		38.24	-77.97	42246.31	-11.10		
6	I	2030-01-25T07:23:21.386		38.10	-77.93	41829.89	-11.05		
Uranus	I	2030-01-25T07:52:33.742		31.85	-74.69	25000.86		8.30	8.68
Uranus	E	2030-01-25T08:28:03.197		24.33	-68.56	25372.71		4.73	4.95
6	E	2030-01-25T08:57:08.615		18.24	-62.81	41877.60	10.90		
5	E	2030-01-25T08:57:47.080		18.11	-62.68	42299.01	10.94		
4	E	2030-01-25T08:58:14.139		18.01	-62.59	42594.04	10.96		
alpha	E	2030-01-25T09:01:26.370		17.35	-61.93	44717.06	11.12		
beta	E	2030-01-25T09:02:50.082		17.06	-61.64	45651.07	11.19		
eta	E	2030-01-25T09:05:05.798		16.59	-61.18	47176.12	11.28		
gamma	E	2030-01-25T09:05:45.210		16.46	-61.04	47621.36	11.31		
delta	E	2030-01-25T09:06:45.142		16.25	-60.84	48300.35	11.35		
lambda	E	2030-01-25T09:09:16.660		15.73	-60.31	50026.71	11.44		
epsilon	E	2030-01-25T09:11:10.129		15.34	-59.92	51328.03	11.54		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-01-25T08:14:35.700  
 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 : 3413198248000757760  
 2Mass ID (if available) : 04521289+2233461  
 ICRS Star Coord at Epoch: 04h 52m 12.89939s +22:33:45.77275s  
 RUWE (>1.4 is poor) : 1.05  
 K magnitude : 10.236  
 G magnitude : 13.269  
 RP magnitude : 12.376  
 BP magnitude : 14.095  
 DUPflag : 0  
 Distance (au) : 18.575  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -12.59  
 Sun-Target sep (deg) : 129.41  
 Sun-Moon sep (deg) : 122.94  
 B (ring opening deg) : 81.59  
 PA of pole (deg) : -29.32  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.419  
 C/A sky separation (km) : 19115.4  
 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	2030-01-25T07:14:10.143		85.11	-42.99	51292.27	-12.15		
lambda	I	2030-01-25T07:15:54.832		84.78	-43.40	50026.71	-12.06		
delta	I	2030-01-25T07:18:18.406		84.31	-43.96	48300.35	-11.98		
gamma	I	2030-01-25T07:19:14.607		84.12	-44.17	47627.73	-11.95		
eta	I	2030-01-25T07:19:52.430		83.99	-44.32	47176.12	-11.93		
beta	I	2030-01-25T07:21:58.189		83.56	-44.81	45681.12	-11.85		
alpha	I	2030-01-25T07:23:21.967		83.26	-45.14	44691.59	-11.79		
4	I	2030-01-25T07:26:21.105		82.63	-45.83	42592.27	-11.66		
5	I	2030-01-25T07:26:50.695		82.52	-45.95	42242.53	-11.64		
6	I	2030-01-25T07:27:27.006		82.39	-46.09	41827.88	-11.60		
Uranus	I	2030-01-25T07:53:54.957		76.47	-52.28	25034.44		8.03	8.41
Uranus	E	2030-01-25T08:36:06.757		66.76	-62.17	25447.62		3.65	3.82
6	E	2030-01-25T09:02:20.620		60.69	-68.34	41876.62	11.53		
5	E	2030-01-25T09:02:56.856		60.55	-68.48	42295.70	11.56		
4	E	2030-01-25T09:03:22.477		60.45	-68.58	42591.45	11.58		
alpha	E	2030-01-25T09:06:25.155		59.75	-69.30	44719.15	11.71		
beta	E	2030-01-25T09:07:44.451		59.44	-69.61	45650.05	11.77		
eta	E	2030-01-25T09:09:53.720		58.94	-70.11	47176.12	11.84		
gamma	E	2030-01-25T09:10:31.289		58.80	-70.26	47621.49	11.87		
delta	E	2030-01-25T09:11:28.425		58.58	-70.49	48300.35	11.90		
lambda	E	2030-01-25T09:13:53.077		58.02	-71.05	50026.71	11.97		
epsilon	E	2030-01-25T09:15:39.917		57.61	-71.47	51308.37	12.06		