

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-01-21T07:33:07.330  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Gaia source ID : 615925561814620800  
 2Mass ID (if available) : 09505086+1350575

Uranus 2045-01-21T07:33:07 K13.56 G14.90 PgtX

ICRS Star Coord at Epoch: 09h 50m 50.86202s +13:50:57.12598s

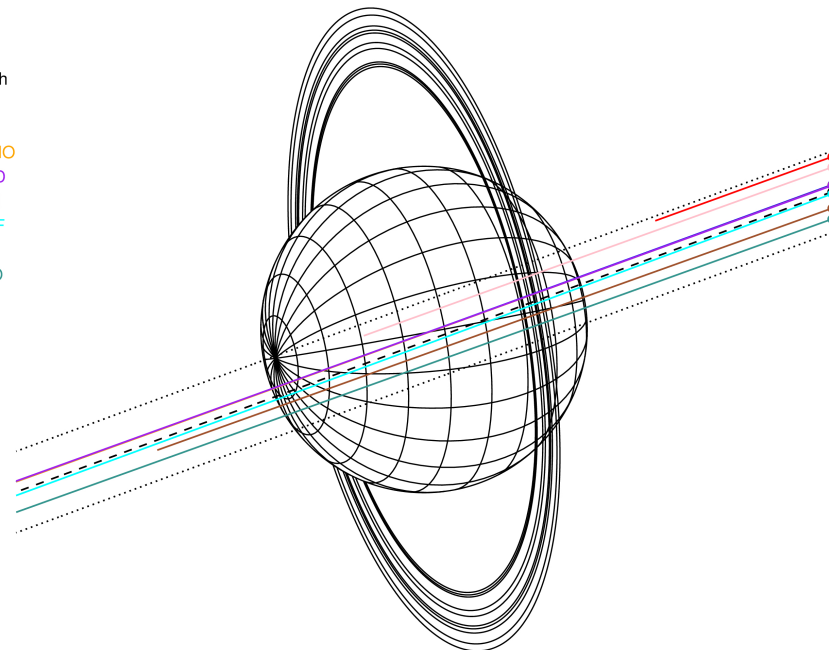
RUWE (>1.4 is poor) : 0.93  
 K magnitude : 13.558  
 G magnitude : 14.897  
 RP magnitude : 14.428  
 BP magnitude : 15.201  
 DUPflag : 0  
 Distance (au) : 17.464  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.48  
 Sun-Target sep (deg) : 155.85  
 Sun-Moon sep (deg) : 170.17  
 B (ring opening deg) : 22.15  
 PA of pole (deg) : 101.00

#	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



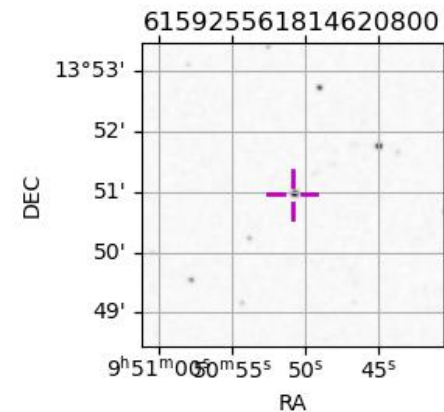
2045-01-21T07:33:07.3300 α: 09 50 50.86202 s: +13 50 57.126 C/A 0.135° PA 20.18 deg v\_sky -20.48 km/s D 17.46 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO

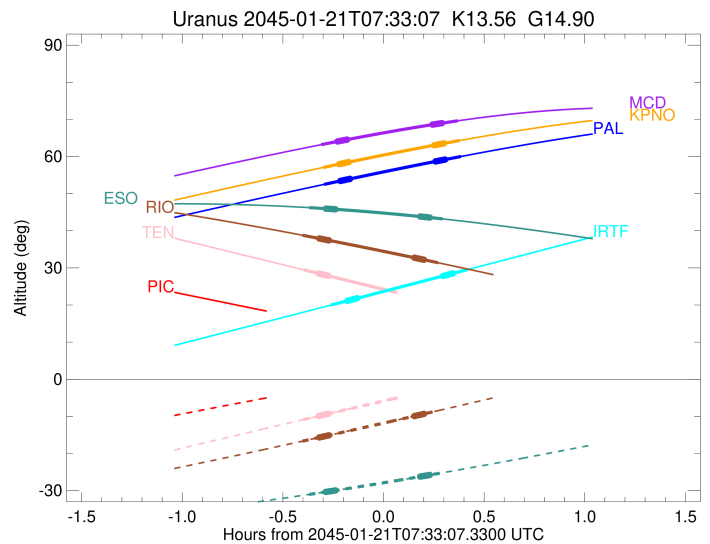
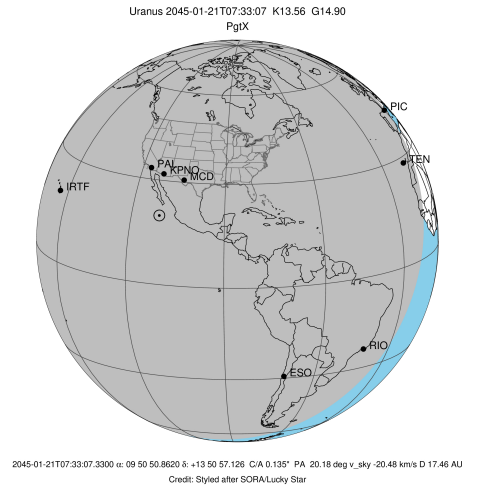


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 21 07:15 - JAN 21 07:56	PieRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4		+	+	JAN 21 07:15 - JAN 21 07:55	PieRnn
MCD	McDonald Obs. 2.7m	30.7	256.0		+	+	JAN 21 07:14 - JAN 21 07:55	PieRnn
TEN	Teide Obs./Tenerife	28.3	343.5		+		JAN 21 07:09 - JAN 21 07:09	PinRnn
IRTF	Mauna Kea/IRTF	19.8	204.5		+	+	JAN 21 07:17 - JAN 21 07:58	PieRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8		+	+	JAN 21 07:08 - JAN 21 07:49	PieRnn
ESO	European Southern Obs	-29.3	289.3		+	+	JAN 21 07:10 - JAN 21 07:50	PieRnn
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



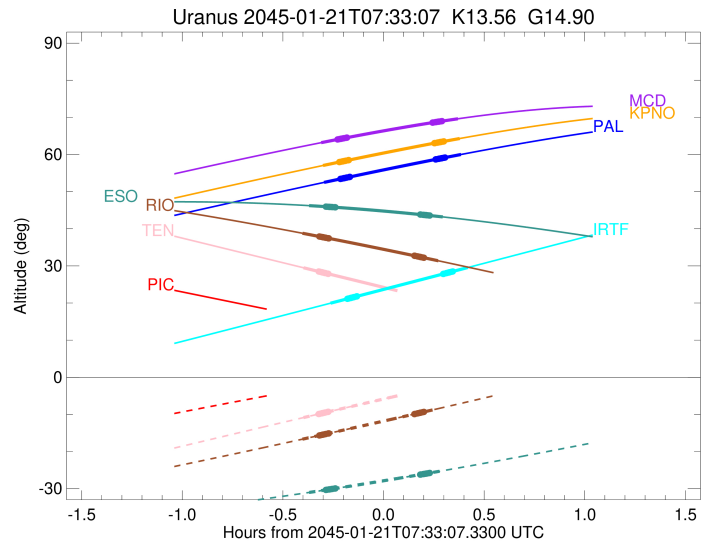
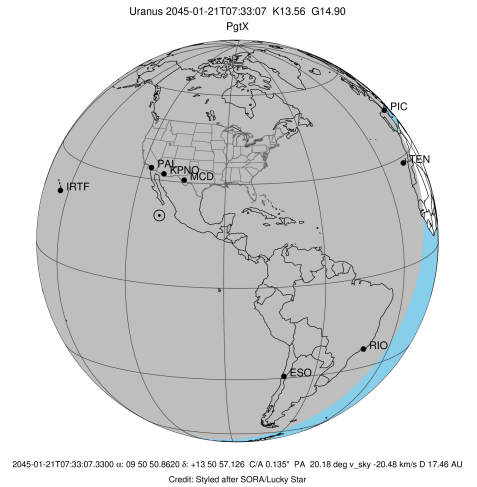
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-01-21T07:35:49.090  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 615925561814620800  
 2Mass ID (if available) : 09505086+1350575  
 ICRS Star Coord at Epoch: 09h 50m 50.86202s +13:50:57.12598s  
 RUWE (>1.4 is poor) : 0.93  
 K magnitude : 13.558  
 G magnitude : 14.897  
 RP magnitude : 14.428  
 BP magnitude : 15.201  
 DUPflag : 0  
 Distance (au) : 17.464  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.48  
 Sun-Target sep (deg) : 155.85  
 Sun-Moon sep (deg) : 170.77  
 B (ring opening deg) : 22.15  
 PA of pole (deg) : 101.00  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.048  
 C/A sky separation (km) : 605.4  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ural11.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ural11.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	2045-01-21T07:20:10.568	b	53.41	-74.10	51554.90	-54.48		
lambda	I	2045-01-21T07:20:38.618	b	53.50	-74.15	50026.71	-54.48		
delta	I	2045-01-21T07:21:10.309	b	53.60	-74.21	48300.35	-54.47		
gamma	I	2045-01-21T07:21:22.782	b	53.64	-74.24	47620.95	-54.47		
eta	I	2045-01-21T07:21:30.949	b	53.67	-74.25	47176.12	-54.41		
beta	I	2045-01-21T07:21:58.224	b	53.76	-74.31	45681.01	-54.45		
alpha	I	2045-01-21T07:22:15.578	b	53.81	-74.34	44747.65	-54.46		
4	I	2045-01-21T07:22:56.456	b	53.94	-74.42	42575.62	-54.52		
5	I	2045-01-21T07:22:58.495	b	53.95	-74.42	42310.59	-54.32		
6	I	2045-01-21T07:23:07.520	b	53.98	-74.44	41807.77	-54.30		
Uranus	I	2045-01-21T07:15:24.620		52.50	-73.50	25478.00		-66.63	-67.56
Uranus	E	2045-01-21T07:56:12.626		60.01	-76.59	25479.19		65.67	66.63
6	E	2045-01-21T07:48:39.217	b	58.69	-76.42	41865.80	54.36		
5	E	2045-01-21T07:48:44.390	b	58.70	-76.42	42160.24	54.38		
4	E	2045-01-21T07:48:49.078	b	58.71	-76.42	42568.04	54.58		
alpha	E	2045-01-21T07:49:28.959	b	58.83	-76.45	44689.85	54.53		
beta	E	2045-01-21T07:49:46.639	b	58.88	-76.46	45641.36	54.52		
eta	E	2045-01-21T07:50:14.604	b	58.97	-76.47	47176.12	54.54		
gamma	E	2045-01-21T07:50:22.955	b	58.99	-76.48	47631.57	54.54		
delta	E	2045-01-21T07:50:35.216	b	59.03	-76.48	48300.35	54.55		
lambda	E	2045-01-21T07:51:06.863	b	59.12	-76.50	50026.71	54.55		
epsilon	E	2045-01-21T07:51:20.019	b	59.16	-76.50	50744.41	54.56		

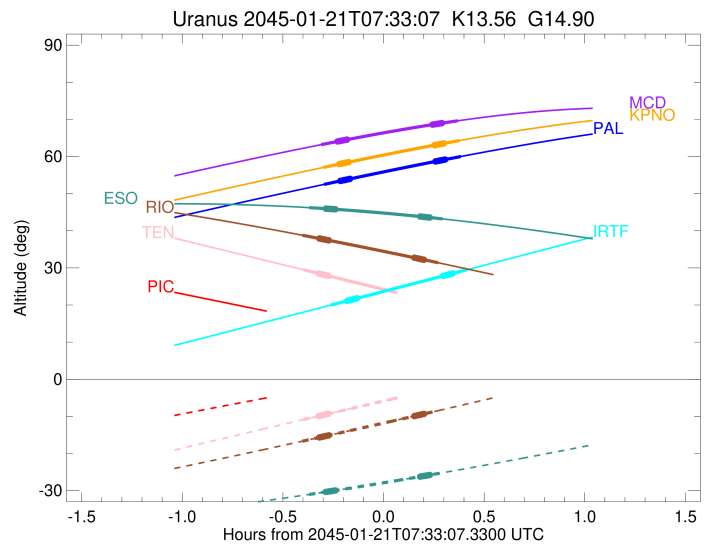
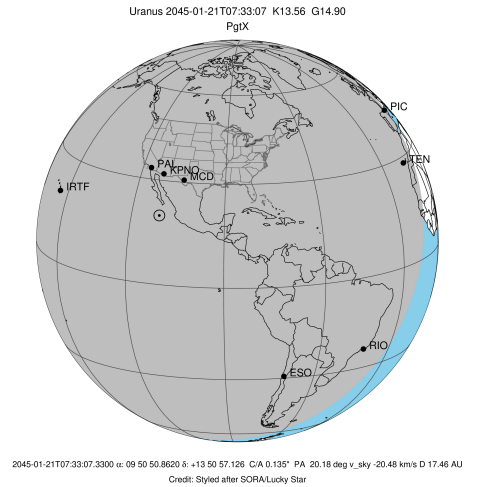
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2045-01-21T07:35:27.850
Event type           : PgtX
: Uranus occs: geocentric, topocentric
: No ring occs
Observer code        : KPNO
Location             : Kitt Peak Natl Obs
Latitude (deg)       : 31.96333
E. Longitude (deg)   : 248.40000
Altitude (km)        : 2.120
Gaia source ID       : 615925561814620800
2Mass ID (if available) : 09505086+1350575
ICRS Star Coord at Epoch: 09h 50m 50.86202s +13:50:57.12598s
RUWE (>1.4 is poor) : 0.93
K magnitude           : 13.558
G magnitude           : 14.897
RP magnitude          : 14.428
BP magnitude          : 15.201
DUPflag              : 0
Distance (au)        : 17.464
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -20.48
Sun-Target sep (deg) : 155.85
Sun-Moon sep (deg)   : 170.72
B (ring opening deg) : 22.15
PA of pole (deg)     : 101.00
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.052
C/A sky separation (km) : 653.6
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.bsp
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
    
```



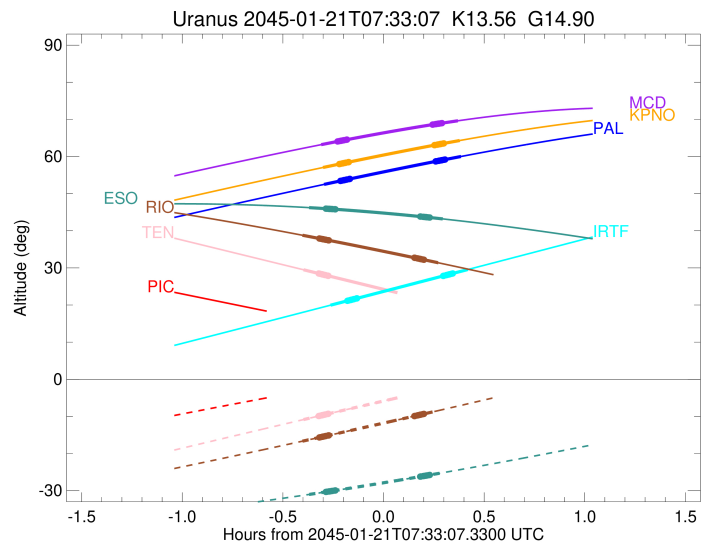
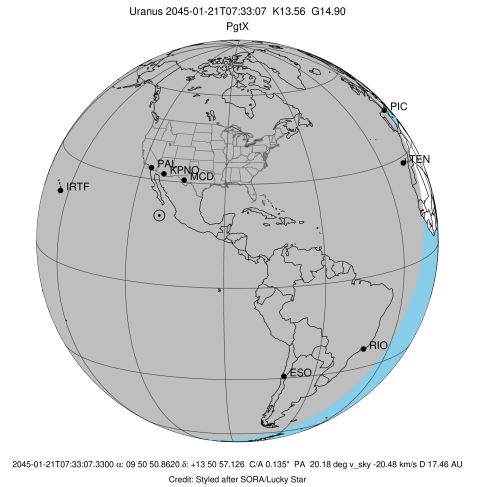
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-01-21T07:19:50.574	b	57.95	-77.35	51554.92	-54.54		
lambda	I	2045-01-21T07:20:18.596	b	58.04	-77.38	50026.71	-54.53		
delta	I	2045-01-21T07:20:50.254	b	58.14	-77.42	48300.35	-54.53		
gamma	I	2045-01-21T07:21:02.714	b	58.18	-77.43	47620.95	-54.52		
eta	I	2045-01-21T07:21:10.873	b	58.20	-77.44	47176.12	-54.52		
beta	I	2045-01-21T07:21:38.120	b	58.29	-77.47	45681.02	-54.50		
alpha	I	2045-01-21T07:21:55.455	b	58.34	-77.49	44747.67	-54.51		
4	I	2045-01-21T07:22:36.292	b	58.47	-77.53	42575.69	-54.57		
5	I	2045-01-21T07:22:38.328	b	58.47	-77.53	42310.62	-54.37		
6	I	2045-01-21T07:22:47.346	b	58.50	-77.54	41807.73	-54.35		
Uranus	I	2045-01-21T07:15:04.573		57.05	-76.98	25477.94		-66.67	-67.61
Uranus	E	2045-01-21T07:55:50.342		64.31	-77.32	25479.22		65.64	66.60
6	E	2045-01-21T07:48:17.549	b	63.06	-77.76	41865.77	54.41		
5	E	2045-01-21T07:48:22.718	b	63.08	-77.75	42160.26	54.43		
4	E	2045-01-21T07:48:27.403	b	63.09	-77.75	42568.08	54.63		
alpha	E	2045-01-21T07:49:07.249	b	63.20	-77.72	44689.87	54.58		
beta	E	2045-01-21T07:49:24.913	b	63.25	-77.70	45641.36	54.57		
eta	E	2045-01-21T07:49:52.855	b	63.33	-77.68	47176.12	54.59		
gamma	E	2045-01-21T07:50:01.199	b	63.35	-77.68	47631.58	54.59		
delta	E	2045-01-21T07:50:13.449	b	63.39	-77.66	48300.34	54.59		
lambda	E	2045-01-21T07:50:45.070	b	63.48	-77.64	50026.71	54.60		
epsilon	E	2045-01-21T07:50:58.214	b	63.51	-77.63	50744.43	54.60		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-01-21T07:34:55.550  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 615925561814620800  
 2Mass ID (if available) : 09505086+1350575  
 ICRS Star Coord at Epoch: 09h 50m 50.86202s +13:50:57.12598s  
 RUWE (>1.4 is poor) : 0.93  
 K magnitude : 13.558  
 G magnitude : 14.897  
 RP magnitude : 14.428  
 BP magnitude : 15.201  
 DUPflag : 0  
 Distance (au) : 17.464  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.48  
 Sun-Target sep (deg) : 155.85  
 Sun-Moon sep (deg) : 170.63  
 B (ring opening deg) : 22.15  
 PA of pole (deg) : 101.00  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.049  
 C/A sky separation (km) : 617.4  
 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



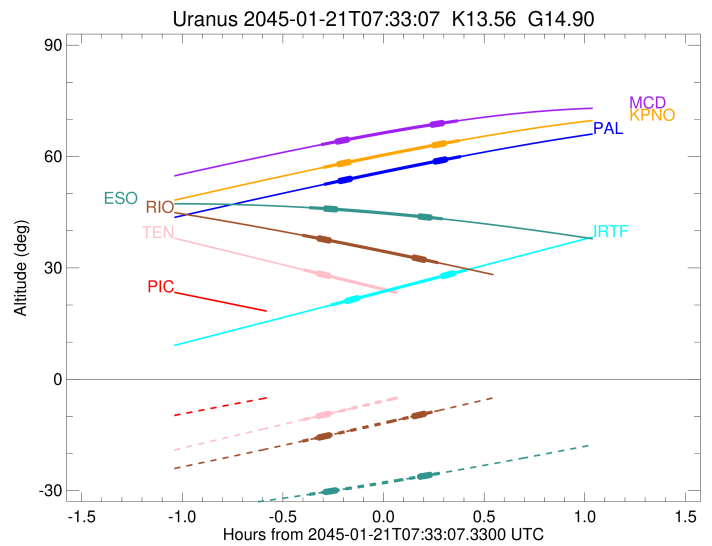
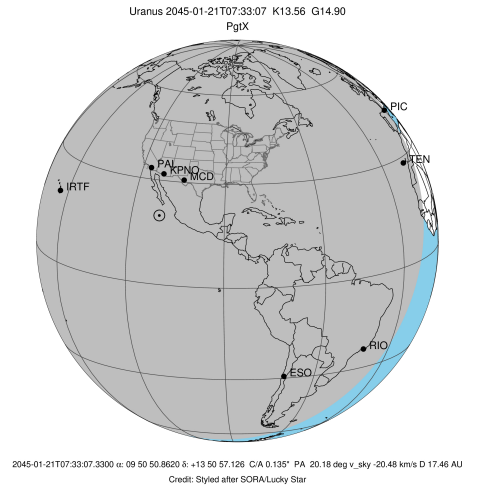
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-01-21T07:19:19.024	b	64.05	-78.95	51554.91	-54.60		
lambda	I	2045-01-21T07:19:47.012	b	64.13	-78.92	50026.71	-54.60		
delta	I	2045-01-21T07:20:18.634	b	64.22	-78.89	48300.35	-54.59		
gamma	I	2045-01-21T07:20:31.079	b	64.26	-78.88	47620.96	-54.59		
eta	I	2045-01-21T07:20:39.229	b	64.28	-78.87	47176.12	-54.59		
beta	I	2045-01-21T07:21:06.444	b	64.36	-78.84	45681.01	-54.57		
alpha	I	2045-01-21T07:21:23.759	b	64.41	-78.82	44747.66	-54.58		
4	I	2045-01-21T07:22:04.550	b	64.53	-78.78	42575.66	-54.63		
5	I	2045-01-21T07:22:06.584	b	64.53	-78.78	42310.61	-54.44		
6	I	2045-01-21T07:22:15.591	b	64.56	-78.77	41807.74	-54.41		
Uranus	I	2045-01-21T07:14:33.435		63.20	-79.16	25477.95		-66.67	-67.60
Uranus	E	2045-01-21T07:55:17.119		69.63	-74.76	25479.16		65.69	66.65
6	E	2045-01-21T07:47:44.277	b	68.60	-75.92	41865.81	54.46		
5	E	2045-01-21T07:47:49.441	b	68.61	-75.91	42160.23	54.48		
4	E	2045-01-21T07:47:54.120	b	68.62	-75.90	42568.02	54.68		
alpha	E	2045-01-21T07:48:33.933	b	68.72	-75.80	44689.85	54.62		
beta	E	2045-01-21T07:48:51.581	b	68.76	-75.76	45641.36	54.61		
eta	E	2045-01-21T07:49:19.499	b	68.82	-75.69	47176.12	54.63		
gamma	E	2045-01-21T07:49:27.835	b	68.84	-75.67	47631.58	54.64		
delta	E	2045-01-21T07:49:40.075	b	68.87	-75.64	48300.35	54.64		
lambda	E	2045-01-21T07:50:11.668	b	68.94	-75.56	50026.71	54.65		
epsilon	E	2045-01-21T07:50:24.801	b	68.97	-75.53	50744.40	54.65		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-01-21T07:29:48.110  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Observer code : TEN  
 Location : Teide Obs./Tenerife  
 Latitude (deg) : 28.30050  
 E. Longitude (deg) : 343.48909  
 Altitude (km) : 2.395  
 Gaia source ID : 615925561814620800  
 2Mass ID (if available) : 09505086+1350575  
 ICRS Star Coord at Epoch: 09h 50m 50.86202s +13:50:57.12598s  
 RUWE (>1.4 is poor) : 0.93  
 K magnitude : 13.558  
 G magnitude : 14.897  
 RP magnitude : 14.428  
 BP magnitude : 15.201  
 DUPflag : 0  
 Distance (au) : 17.464  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.48  
 Sun-Target sep (deg) : 155.85  
 Sun-Moon sep (deg) : 169.70  
 B (ring opening deg) : 22.15  
 PA of pole (deg) : 101.00  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.180  
 C/A sky separation (km) : 2276.5  
 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



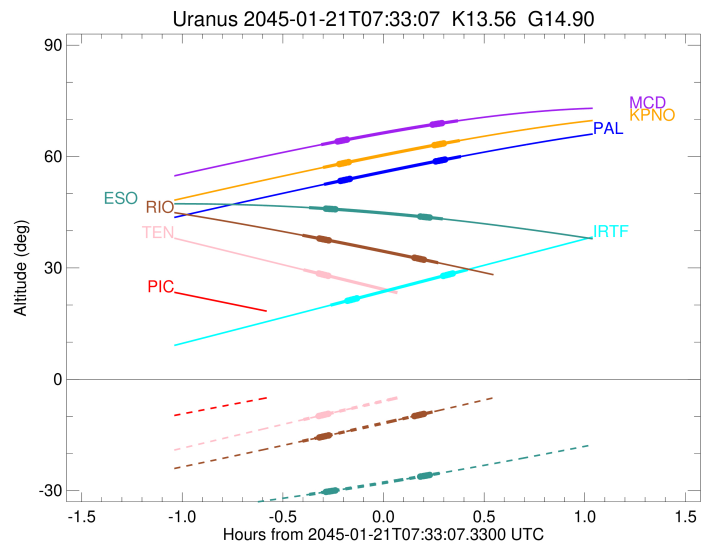
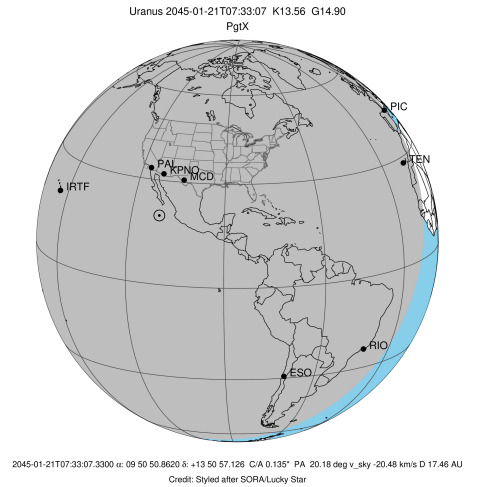
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-01-21T07:13:42.906	b	28.52	-9.92	51553.27	-53.98		
lambda	I	2045-01-21T07:14:11.188	b	28.41	-9.82	50026.71	-53.97		
delta	I	2045-01-21T07:14:43.179	b	28.29	-9.71	48300.35	-53.96		
gamma	I	2045-01-21T07:14:55.770	b	28.25	-9.67	47620.96	-53.95		
eta	I	2045-01-21T07:15:04.016	b	28.22	-9.64	47176.12	-53.95		
beta	I	2045-01-21T07:15:31.557	b	28.12	-9.54	45680.79	-53.93		
alpha	I	2045-01-21T07:15:49.132	b	28.05	-9.48	44746.48	-53.93		
4	I	2045-01-21T07:16:30.388	b	27.90	-9.34	42572.57	-53.98		
5	I	2045-01-21T07:16:32.495	b	27.89	-9.33	42308.58	-53.78		
6	I	2045-01-21T07:16:41.512	b	27.86	-9.30	41809.94	-53.76		
Uranus	I	2045-01-21T07:09:16.172		29.50	-10.86	25481.30		-64.02	-65.03
Uranus	E	2045-01-21T07:50:21.644		20.43	-2.29x	25476.88		67.56	68.46
6	E	2045-01-21T07:42:27.147	b	22.17	-3.92x	41867.95	53.64		
5	E	2045-01-21T07:42:32.338	b	22.15	-3.91x	42158.39	53.66		
4	E	2045-01-21T07:42:37.012	b	22.13	-3.89x	42564.90	53.85		
alpha	E	2045-01-21T07:43:17.524	b	21.98	-3.75x	44688.72	53.81		
beta	E	2045-01-21T07:43:35.419	b	21.92	-3.69x	45641.17	53.80		
eta	E	2045-01-21T07:44:03.765	b	21.81	-3.59x	47176.12	53.82		
gamma	E	2045-01-21T07:44:12.227	b	21.78	-3.56x	47631.57	53.82		
delta	E	2045-01-21T07:44:24.652	b	21.74	-3.52x	48300.35	53.83		
lambda	E	2045-01-21T07:44:56.722	b	21.62	-3.41x	50026.71	53.84		
epsilon	E	2045-01-21T07:45:10.036	b	21.57	-3.36x	50743.53	53.84		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-01-21T07:37:49.110  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Observer code : IRTF  
 Location : Mauna Kea/IRTF  
 Latitude (deg) : 19.82622  
 E. Longitude (deg) : 204.52800  
 Altitude (km) : 4.168  
 Gaia source ID : 615925561814620800  
 2Mass ID (if available) : 09505086+1350575  
 ICRS Star Coord at Epoch: 09h 50m 50.86202s +13:50:57.12598s  
 RUWE (>1.4 is poor) : 0.93  
 K magnitude : 13.558  
 G magnitude : 14.897  
 RP magnitude : 14.428  
 BP magnitude : 15.201  
 DUPflag : 0  
 Distance (au) : 17.464  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.48  
 Sun-Target sep (deg) : 155.85  
 Sun-Moon sep (deg) : 171.03  
 B (ring opening deg) : 22.15  
 PA of pole (deg) : 101.00  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.182  
 C/A sky separation (km) : 2304.4  
 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



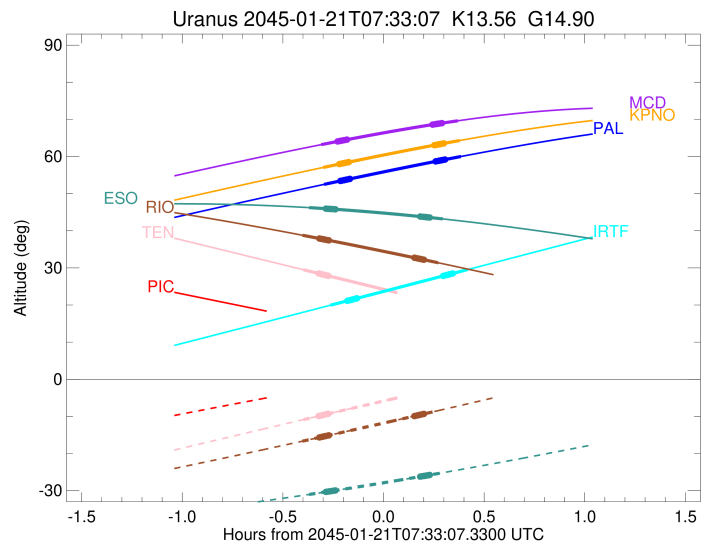
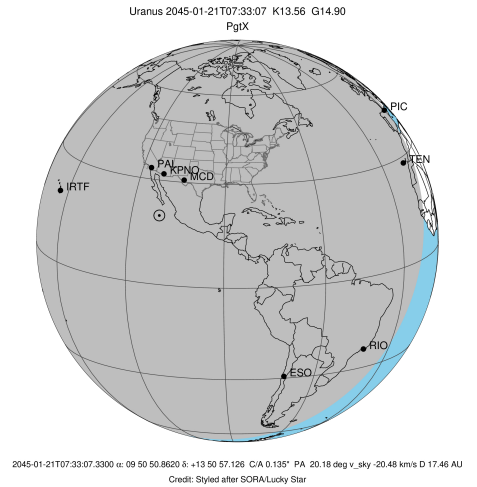
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-01-21T07:22:15.523	b	21.11	-45.25	51555.27	-53.97		
lambda	I	2045-01-21T07:22:43.846	b	21.22	-45.36	50026.72	-53.96		
delta	I	2045-01-21T07:23:15.839	b	21.35	-45.48	48300.35	-53.96		
gamma	I	2045-01-21T07:23:28.431	b	21.40	-45.53	47620.97	-53.95		
eta	I	2045-01-21T07:23:36.676	b	21.43	-45.57	47176.12	-53.95		
beta	I	2045-01-21T07:24:04.213	b	21.53	-45.67	45681.11	-53.93		
alpha	I	2045-01-21T07:24:21.703	b	21.60	-45.74	44748.27	-53.94		
4	I	2045-01-21T07:25:02.989	b	21.76	-45.90	42577.36	-53.99		
5	I	2045-01-21T07:25:05.035	b	21.77	-45.91	42311.58	-53.79		
6	I	2045-01-21T07:25:14.202	b	21.81	-45.94	41806.59	-53.77		
Uranus	I	2045-01-21T07:17:20.174		19.96	-44.11	25476.97		-67.49	-68.40
Uranus	E	2045-01-21T07:58:16.141		29.56	-53.65	25481.66		63.75	64.77
6	E	2045-01-21T07:50:55.532	b	27.83	-51.93	41864.41	53.91		
5	E	2045-01-21T07:51:00.785	b	27.85	-51.95	42161.54	53.94		
4	E	2045-01-21T07:51:05.569	b	27.87	-51.97	42569.96	54.14		
alpha	E	2045-01-21T07:51:45.719	b	28.03	-52.13	44690.61	54.09		
beta	E	2045-01-21T07:52:03.553	b	28.10	-52.20	45641.51	54.08		
eta	E	2045-01-21T07:52:31.741	b	28.21	-52.31	47176.12	54.11		
gamma	E	2045-01-21T07:52:40.159	b	28.24	-52.34	47631.57	54.11		
delta	E	2045-01-21T07:52:52.518	b	28.29	-52.39	48300.35	54.11		
lambda	E	2045-01-21T07:53:24.417	b	28.42	-52.51	50026.71	54.13		
epsilon	E	2045-01-21T07:53:37.698	b	28.47	-52.56	50745.63	54.13		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-01-21T07:29:11.050  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Observer code : RIO  
 Location : Rio de Janeiro  
 Latitude (deg) : -22.89506  
 E. Longitude (deg) : 316.77708  
 Altitude (km) : 0.033  
 Gaia source ID : 615925561814620800  
 2Mass ID (if available) : 09505086+1350575  
 ICRS Star Coord at Epoch: 09h 50m 50.86202s +13:50:57.12598s  
 RUWE (>1.4 is poor) : 0.93  
 K magnitude : 13.558  
 G magnitude : 14.897  
 RP magnitude : 14.428  
 BP magnitude : 15.201  
 DUPflag : 0  
 Distance (au) : 17.464  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.48  
 Sun-Target sep (deg) : 155.85  
 Sun-Moon sep (deg) : 169.54  
 B (ring opening deg) : 22.15  
 PA of pole (deg) : 101.00  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.291  
 C/A sky separation (km) : 3685.1  
 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	2045-01-21T07:13:53.091	b	37.94	-15.70	51555.22	-54.32		
lambda	I	2045-01-21T07:14:21.235	b	37.86	-15.60	50026.71	-54.30		
delta	I	2045-01-21T07:14:53.032	b	37.76	-15.50	48300.35	-54.28		
gamma	I	2045-01-21T07:15:05.549	b	37.73	-15.45	47620.97	-54.27		
eta	I	2045-01-21T07:15:13.746	b	37.70	-15.43	47176.12	-54.27		
beta	I	2045-01-21T07:15:41.123	b	37.62	-15.34	45681.17	-54.24		
alpha	I	2045-01-21T07:15:58.485	b	37.57	-15.28	44748.81	-54.24		
4	I	2045-01-21T07:16:39.554	b	37.45	-15.14	42578.99	-54.28		
5	I	2045-01-21T07:16:41.586	b	37.44	-15.13	42312.41	-54.08		
6	I	2045-01-21T07:16:50.754	b	37.42	-15.10	41805.52	-54.05		
Uranus	I	2045-01-21T07:08:57.108		38.80	-16.68	25476.54		-67.85	-68.74
Uranus	E	2045-01-21T07:49:26.680		31.38	-8.45	25483.59		62.32	63.38
6	E	2045-01-21T07:42:19.730	b	32.74	-9.92	41863.42	54.00		
5	E	2045-01-21T07:42:25.003	b	32.72	-9.90	42162.53	54.02		
4	E	2045-01-21T07:42:29.823	b	32.71	-9.88	42571.29	54.23		
alpha	E	2045-01-21T07:43:09.862	b	32.58	-9.75	44691.16	54.18		
beta	E	2045-01-21T07:43:27.673	b	32.53	-9.69	45641.64	54.18		
eta	E	2045-01-21T07:43:55.809	b	32.44	-9.59	47176.12	54.20		
gamma	E	2045-01-21T07:44:04.211	b	32.41	-9.56	47631.56	54.21		
delta	E	2045-01-21T07:44:16.548	b	32.37	-9.52	48300.35	54.21		
lambda	E	2045-01-21T07:44:48.388	b	32.27	-9.41	50026.71	54.23		
epsilon	E	2045-01-21T07:45:01.665	b	32.23	-9.36	50746.72	54.24		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-01-21T07:30:51.640  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Observer code : ESO  
 Location : European Southern Obs. (3.6m)  
 Latitude (deg) : -29.26097  
 E. Longitude (deg) : 289.26831  
 Altitude (km) : 2.400  
 Gaia source ID : 615925561814620800  
 2Mass ID (if available) : 09505086+1350575  
 ICRS Star Coord at Epoch: 09h 50m 50.86202s +13:50:57.12598s  
 RUWE (>1.4 is poor) : 0.93  
 K magnitude : 13.558  
 G magnitude : 14.897  
 RP magnitude : 14.428  
 BP magnitude : 15.201  
 DUPflag : 0  
 Distance (au) : 17.464  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.48  
 Sun-Target sep (deg) : 155.85  
 Sun-Moon sep (deg) : 169.82  
 B (ring opening deg) : 22.15  
 PA of pole (deg) : 101.00  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.423  
 C/A sky separation (km) : 5355.9  
 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	2045-01-21T07:15:50.439	b	45.97	-30.36	51554.75	-54.34		
lambda	I	2045-01-21T07:16:18.562	b	45.94	-30.29	50026.72	-54.32		
delta	I	2045-01-21T07:16:50.351	b	45.91	-30.22	48300.35	-54.29		
gamma	I	2045-01-21T07:17:02.865	b	45.89	-30.19	47620.99	-54.28		
eta	I	2045-01-21T07:17:11.062	b	45.89	-30.17	47176.12	-54.27		
beta	I	2045-01-21T07:17:38.442	b	45.86	-30.11	45681.21	-54.23		
alpha	I	2045-01-21T07:17:55.776	b	45.84	-30.07	44749.36	-54.23		
4	I	2045-01-21T07:18:36.866	b	45.80	-29.97	42580.76	-54.25		
5	I	2045-01-21T07:18:38.907	b	45.80	-29.97	42313.20	-54.04		
6	I	2045-01-21T07:18:48.132	b	45.79	-29.95	41804.40	-54.00		
Uranus	I	2045-01-21T07:10:56.561		46.24	-31.03	25476.82		-67.61	-68.51
Uranus	E	2045-01-21T07:50:47.680		43.20	-25.17	25486.98		59.92	61.04
6	E	2045-01-21T07:44:04.397	b	43.84	-26.22	41862.04	54.01		
5	E	2045-01-21T07:44:09.710	b	43.83	-26.21	42163.97	54.05		
4	E	2045-01-21T07:44:14.593	b	43.82	-26.20	42573.11	54.25		
alpha	E	2045-01-21T07:44:54.547	b	43.76	-26.09	44691.94	54.23		
beta	E	2045-01-21T07:45:12.350	b	43.73	-26.05	45641.83	54.23		
eta	E	2045-01-21T07:45:40.452	b	43.69	-25.97	47176.12	54.27		
gamma	E	2045-01-21T07:45:48.843	b	43.68	-25.95	47631.54	54.28		
delta	E	2045-01-21T07:46:01.165	b	43.66	-25.92	48300.35	54.29		
lambda	E	2045-01-21T07:46:32.958	b	43.61	-25.84	50026.71	54.31		
epsilon	E	2045-01-21T07:46:46.248	b	43.59	-25.80	50748.65	54.33		