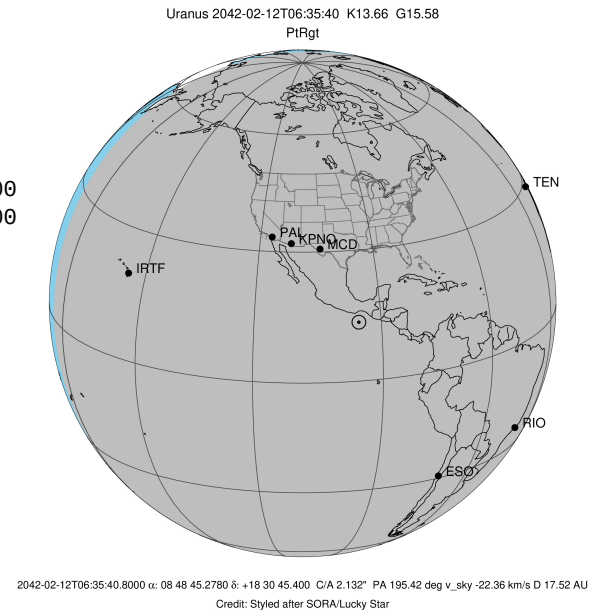
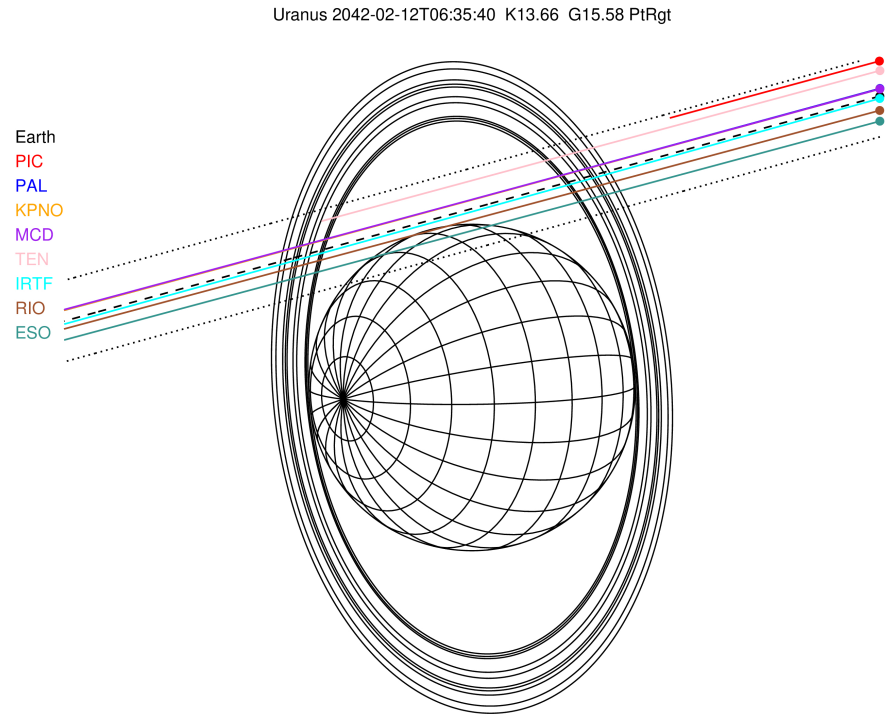
Stellar occultation prediction by rfrench@wellesley.edu Sun Jun 25 02:33:03 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2042-02-12T06:35:40.800
Event type : PtRgt
: Uranus occs: topocentric, not geoecetric
: Ring occs: geocentric, topocentric
Gaia source ID : 660208323904541312
2Mass ID (if available) : 08484528+1830455

ICRS Star Coord at Epoch: 08h 48m 45.27801s +18:30:45.39975s
RUWE (>1.4 is poor) : 0.99
K magnitude : 13.660
G magnitude : 15.583
RP magnitude : 14.976
BP magnitude : 16.010
DUPflag : 0
Distance (au) : 17.522
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -22.36
Sun-Target sep (deg) : 166.46
Sun-Moon sep (deg) : 92.02
B (ring opening deg) : 37.56
PA of pole (deg) : 95.21

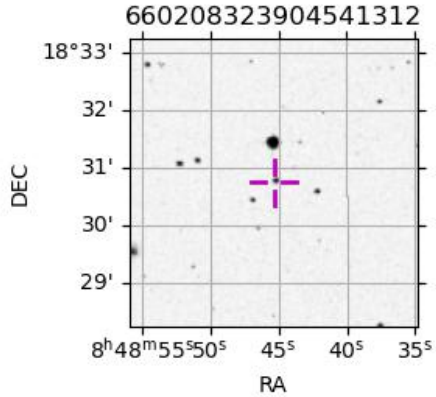
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon





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	|++++++++++	|	++++++++++ |	FEB 12 06:14 - FEB 12 06:53 |	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	|	|	|	|	PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	|++++++++++	|	++++++++++ |	FEB 12 06:14 - FEB 12 06:52 |	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	|++++++++++	|	++++++++++ |	FEB 12 06:14 - FEB 12 06:52 |	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	|++++++++++	|	+++ |	FEB 12 06:11 - FEB 12 06:42 |	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5	|++++++++++	|	++++++++++ |	FEB 12 06:16 - FEB 12 06:56 |	PnnRie
KAV	Kavalur Observatory	12.6	78.8	|	|	|	|	PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	|++++++++++	+ + |	++++++++++ |	FEB 12 06:08 - FEB 12 06:49 |	PieRie
ESO	European Southern Obs	-29.3	289.3	|++++++++++	+ + |	++++++++++ |	FEB 12 06:09 - FEB 12 06:50 |	PieRie
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



Uranus_2042-02-12T06_35_40.8000_PAL.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:19:12 2023

```
target                  : Uranus
target radius (km)      :  25559.00
C/A epoch               : 2042-02-12T06:36:27.980
Event type              : PtRgt
: Uranus occs: topocentric, not geoecetric
: 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          : 660208323904541312
2Mass ID (if available) : 08484528+1830455
ICRS Star Coord at Epoch: 08h 48m 45.27801s +18:30:45.39975s
RUWE (>1.4 is poor)     :   0.99
K magnitude             : 13.660
G magnitude             : 15.583
RP magnitude            : 14.976
BP magnitude            : 16.010
DUPflag                 : 0
Distance (au)           : 17.522
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    : -22.36
Sun-Target sep (deg)    :  166.46
Sun-Moon sep (deg)      :   92.89
B (ring opening deg)    :   37.56
PA of pole (deg)        :   95.21
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  :   2.234
C/A sky separation (km) :  28386.4
NAIF SPICE kernels      : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
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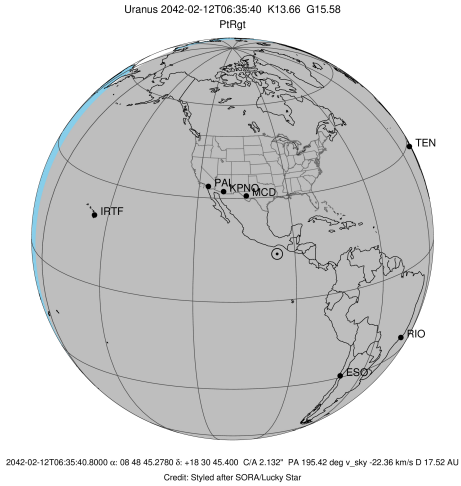
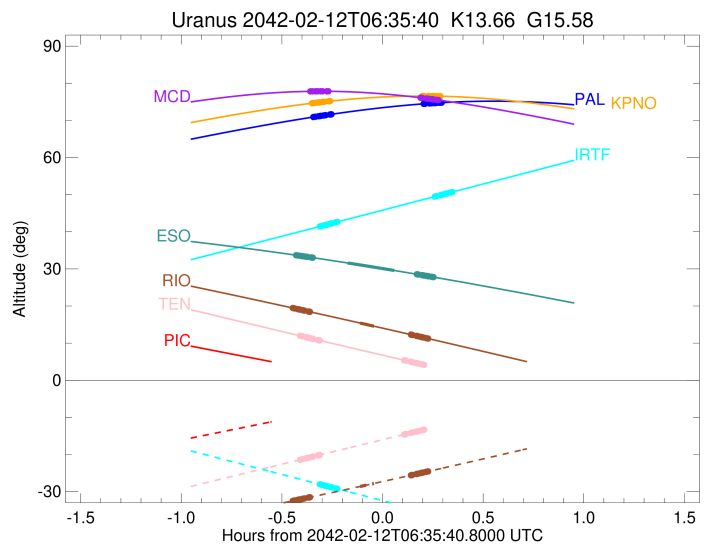




b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

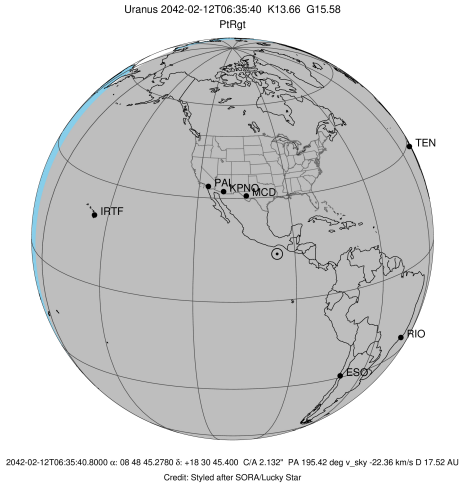
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2042-02-12T06:14:58.661		70.90	-58.87	51341.33	-30.49		
lambda	I	2042-02-12T06:15:41.835		71.00	-59.00	50026.71	-30.26		
delta	I	2042-02-12T06:16:39.391		71.13	-59.17	48300.35	-29.72		
gamma	I	2042-02-12T06:17:02.077		71.19	-59.23	47628.79	-29.49		
eta	I	2042-02-12T06:17:17.470		71.22	-59.28	47176.12	-29.32		
beta	I	2042-02-12T06:18:09.269		71.34	-59.43	45668.28	-28.73		
alpha	I	2042-02-12T06:18:42.654		71.42	-59.53	44711.69	-28.35		
4	I	2042-02-12T06:19:57.859		71.58	-59.74	42607.01	-27.29		
5	I	2042-02-12T06:20:09.988		71.61	-59.78	42283.90	-27.08		
6	I	2042-02-12T06:20:24.179		71.64	-59.82	41879.67	-26.91		

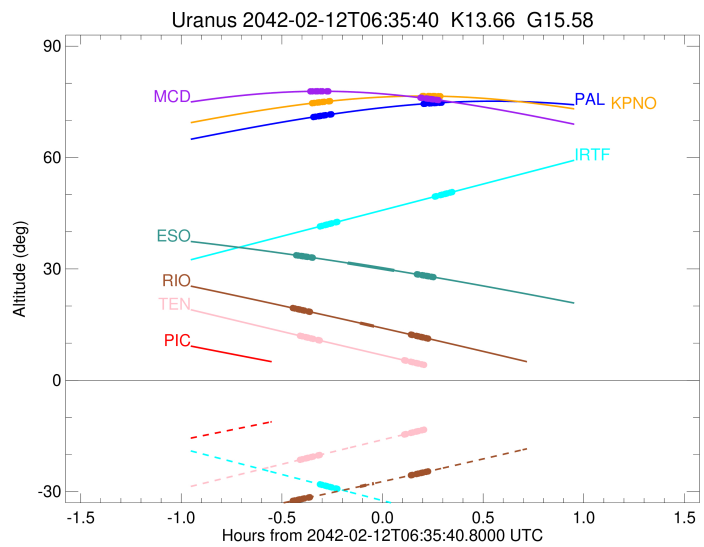
No planet occultations

6	E	2042-02-12T06:47:54.569		74.46	-64.25	41837.22	26.91		
5	E	2042-02-12T06:48:09.246		74.48	-64.29	42167.89	27.08		
4	E	2042-02-12T06:48:21.067		74.49	-64.32	42540.26	27.29		
alpha	E	2042-02-12T06:49:40.610		74.58	-64.51	44752.42	28.35		
beta	E	2042-02-12T06:50:12.092		74.61	-64.59	45641.29	28.73		
eta	E	2042-02-12T06:51:04.893		74.66	-64.71	47176.12	29.33		
gamma	E	2042-02-12T06:51:20.329		74.68	-64.75	47630.07	29.49		
delta	E	2042-02-12T06:51:42.969		74.70	-64.81	48300.35	29.72		
lambda	E	2042-02-12T06:52:40.521		74.75	-64.94	50026.71	30.26		
epsilon	E	2042-02-12T06:53:04.224		74.77	-65.00	50746.51	30.49		

Uranus_2042-02-12T06_35_40.8000_KPNO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:23:36 2023

```
target                  : Uranus
target radius (km)      :  25559.00
C/A epoch               : 2042-02-12T06:36:04.850
Event type              : PtRgt
: Uranus occs: topocentric, not geoecetric
: 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          : 660208323904541312
2Mass ID (if available) : 08484528+1830455
ICRS Star Coord at Epoch: 08h 48m 45.27801s +18:30:45.39975s
RUWE (>1.4 is poor)     :   0.99
K magnitude             : 13.660
G magnitude             : 15.583
RP magnitude            : 14.976
BP magnitude            : 16.010
DUPflag                 : 0
Distance (au)           : 17.522
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    : -22.36
Sun-Target sep (deg)    :  166.46
Sun-Moon sep (deg)      :   92.91
B (ring opening deg)    :   37.56
PA of pole (deg)        :   95.21
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  :   2.231
C/A sky separation (km) :  28356.1
NAIF SPICE kernels      : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
```





b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

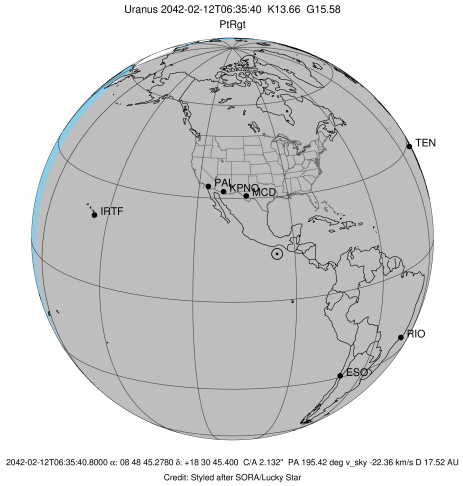
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2042-02-12T06:14:36.028		74.63	-63.24	51341.73	-30.52		
lambda	I	2042-02-12T06:15:19.171		74.71	-63.36	50026.71	-30.29		
delta	I	2042-02-12T06:16:16.667		74.81	-63.52	48300.35	-29.75		
gamma	I	2042-02-12T06:16:39.327		74.85	-63.58	47628.78	-29.52		
eta	I	2042-02-12T06:16:54.703		74.88	-63.62	47176.12	-29.36		
beta	I	2042-02-12T06:17:46.442		74.96	-63.77	45668.30	-28.76		
alpha	I	2042-02-12T06:18:19.789		75.02	-63.86	44711.64	-28.39		
4	I	2042-02-12T06:19:34.893		75.14	-64.06	42607.05	-27.33		
5	I	2042-02-12T06:19:47.001		75.16	-64.09	42283.99	-27.11		
6	I	2042-02-12T06:20:01.177		75.19	-64.13	41879.67	-26.94		

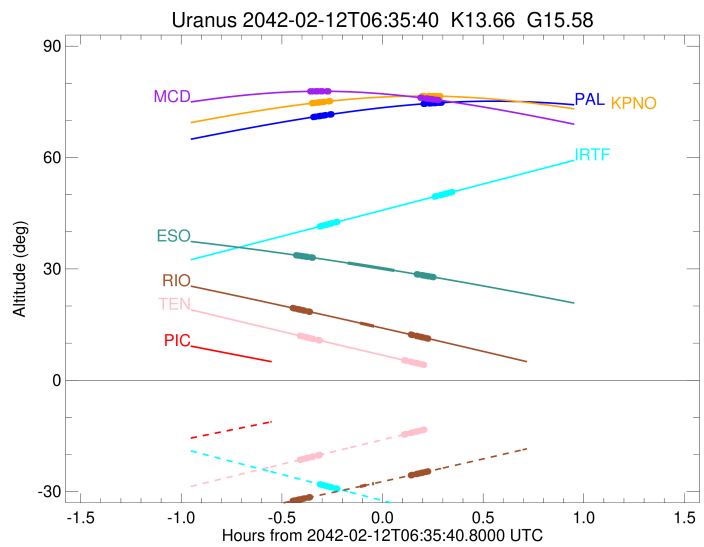
No planet occultations

6	E	2042-02-12T06:47:32.638		76.57	-68.16	41837.18	26.94		
5	E	2042-02-12T06:47:47.297		76.57	-68.19	42167.86	27.11		
4	E	2042-02-12T06:47:59.104		76.56	-68.22	42540.23	27.33		
alpha	E	2042-02-12T06:49:18.559		76.56	-68.38	44752.42	28.38		
beta	E	2042-02-12T06:49:50.010		76.56	-68.45	45641.29	28.76		
eta	E	2042-02-12T06:50:42.762		76.55	-68.55	47176.12	29.35		
gamma	E	2042-02-12T06:50:58.184		76.54	-68.58	47630.07	29.52		
delta	E	2042-02-12T06:51:20.805		76.54	-68.63	48300.35	29.75		
lambda	E	2042-02-12T06:52:18.310		76.52	-68.74	50026.71	30.29		
epsilon	E	2042-02-12T06:52:41.994		76.52	-68.79	50746.49	30.51		

Uranus_2042-02-12T06_35_40.8000_MCD.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:25:44 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2042-02-12T06:35:31.710
Event type : PtRgt
: Uranus occs: topocentric, not geoecetric
: 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 : 660208323904541312
2Mass ID (if available) : 08484528+1830455
ICRS Star Coord at Epoch: 08h 48m 45.27801s +18:30:45.39975s
RUWE (>1.4 is poor) : 0.99
K magnitude : 13.660
G magnitude : 15.583
RP magnitude : 14.976
BP magnitude : 16.010
DUPflag : 0
Distance (au) : 17.522
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -22.36
Sun-Target sep (deg) : 166.46
Sun-Moon sep (deg) : 92.91
B (ring opening deg) : 37.56
PA of pole (deg) : 95.21
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.236
C/A sky separation (km) : 28415.6
NAIF SPICE kernels : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk





b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

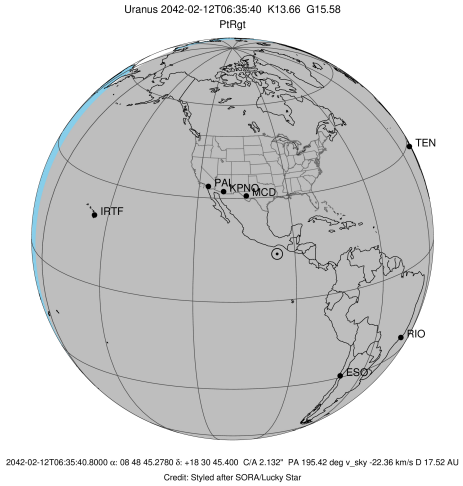
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2042-02-12T06:14:04.478		77.83	-68.75	51341.41	-30.50		
lambda	I	2042-02-12T06:14:47.640		77.84	-68.85	50026.71	-30.27		
delta	I	2042-02-12T06:15:45.179		77.85	-68.98	48300.35	-29.73		
gamma	I	2042-02-12T06:16:07.858		77.85	-69.04	47628.78	-29.50		
eta	I	2042-02-12T06:16:23.248		77.85	-69.07	47176.12	-29.33		
beta	I	2042-02-12T06:17:15.038		77.85	-69.19	45668.28	-28.73		
alpha	I	2042-02-12T06:17:48.420		77.85	-69.26	44711.68	-28.35		
4	I	2042-02-12T06:19:03.622		77.85	-69.43	42607.01	-27.29		
5	I	2042-02-12T06:19:15.752		77.85	-69.45	42283.90	-27.07		
6	I	2042-02-12T06:19:29.944		77.84	-69.49	41879.67	-26.90		

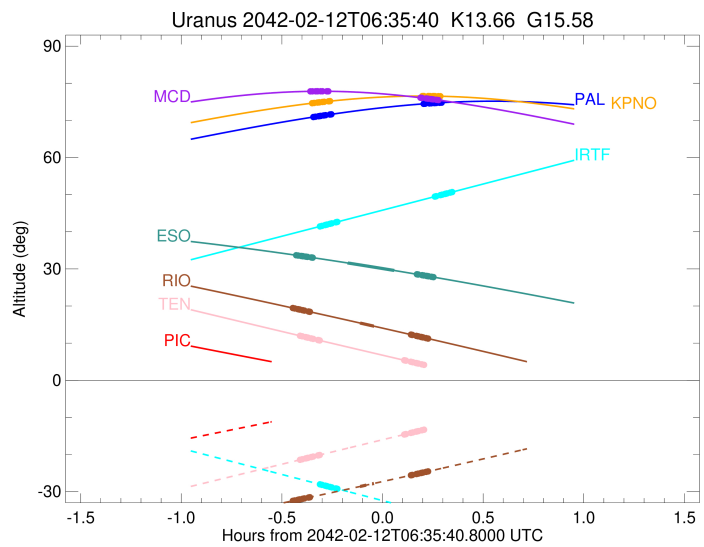
No planet occultations

6	E	2042-02-12T06:46:58.300		76.11	-72.30	41837.28	26.89		
5	E	2042-02-12T06:47:12.984		76.09	-72.31	42167.96	27.06		
4	E	2042-02-12T06:47:24.813		76.06	-72.33	42540.31	27.28		
alpha	E	2042-02-12T06:48:44.391		75.91	-72.42	44752.42	28.34		
beta	E	2042-02-12T06:49:15.886		75.85	-72.45	45641.29	28.72		
eta	E	2042-02-12T06:50:08.707		75.75	-72.50	47176.12	29.32		
gamma	E	2042-02-12T06:50:24.148		75.72	-72.52	47630.08	29.48		
delta	E	2042-02-12T06:50:46.795		75.67	-72.54	48300.35	29.71		
lambda	E	2042-02-12T06:51:44.365		75.56	-72.60	50026.71	30.26		
epsilon	E	2042-02-12T06:52:08.077		75.51	-72.62	50746.58	30.48		

Uranus_2042-02-12T06_35_40.8000_TEN.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:27:52 2023

```
target                  : Uranus
target radius (km)      :  25559.00
C/A epoch               : 2042-02-12T06:32:05.750
Event type              : PtRgt
: Uranus occs: topocentric, not geoecetric
: Ring occs: geocentric, topocentric
Observer code           : TEN
Location                : Teide Obs./Tenerife
Latitude (deg)          :  28.30050
E. Longitude (deg)      : 343.48909
Altitude (km)           :   2.395
Gaia source ID          : 660208323904541312
2Mass ID (if available) : 08484528+1830455
ICRS Star Coord at Epoch: 08h 48m 45.27801s +18:30:45.39975s
RUWE (>1.4 is poor)     :   0.99
K magnitude             : 13.660
G magnitude             : 15.583
RP magnitude            : 14.976
BP magnitude            : 16.010
DUPflag                 : 0
Distance (au)           : 17.522
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    : -22.36
Sun-Target sep (deg)    :  166.46
Sun-Moon sep (deg)      :   92.16
B (ring opening deg)    :   37.56
PA of pole (deg)        :   95.21
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  :   2.463
C/A sky separation (km) :  31297.5
NAIF SPICE kernels      : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
```





b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

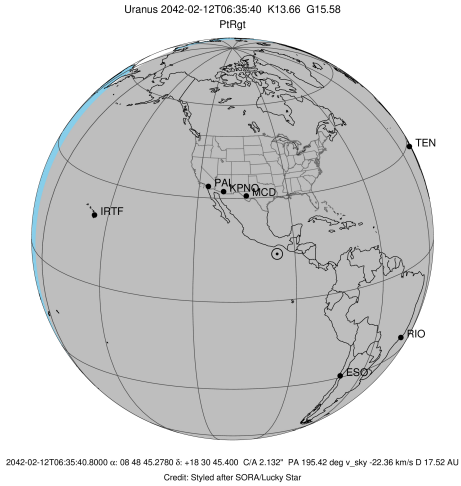
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2042-02-12T06:11:00.133		12.00	-21.44	51315.86	-28.45		
lambda	I	2042-02-12T06:11:45.550		11.84	-21.28	50026.71	-28.15		
delta	I	2042-02-12T06:12:47.625		11.62	-21.05	48300.35	-27.46		
gamma	I	2042-02-12T06:13:12.199		11.53	-20.96	47629.14	-27.17		
eta	I	2042-02-12T06:13:28.940		11.47	-20.90	47176.12	-26.96		
beta	I	2042-02-12T06:14:25.589		11.27	-20.69	45666.67	-26.19		
alpha	I	2042-02-12T06:15:02.124		11.14	-20.56	44714.62	-25.70		
4	I	2042-02-12T06:16:26.046		10.84	-20.25	42604.16	-24.31		
5	I	2042-02-12T06:16:39.947		10.79	-20.20	42277.43	-24.04		
6	I	2042-02-12T06:16:55.590		10.74	-20.14	41879.71	-23.80		

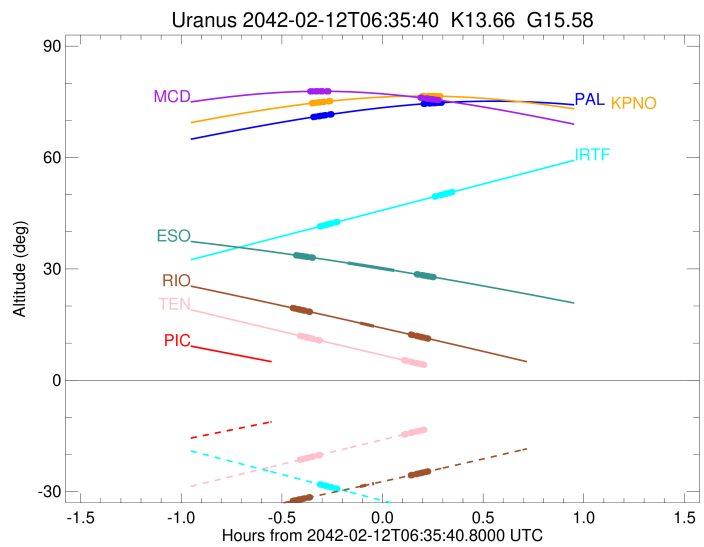
No planet occultations

6	E	2042-02-12T06:42:08.421		5.40	-14.61	41841.54	23.75		
5	E	2042-02-12T06:42:24.923		5.34	-14.55	42172.61	23.99		
4	E	2042-02-12T06:42:38.321		5.29	-14.51	42543.66	24.26		
alpha	E	2042-02-12T06:44:06.918		4.98x	-14.18	44752.21	25.64		
beta	E	2042-02-12T06:44:41.654		4.86x	-14.06	45641.62	26.13		
eta	E	2042-02-12T06:45:39.486		4.66x	-13.85	47176.12	26.88		
gamma	E	2042-02-12T06:45:56.318		4.60x	-13.79	47630.36	27.09		
delta	E	2042-02-12T06:46:20.916		4.51x	-13.70	48300.35	27.38		
lambda	E	2042-02-12T06:47:23.173		4.29x	-13.47	50026.71	28.07		
epsilon	E	2042-02-12T06:47:48.863		4.20x	-13.38	50751.10	28.36		

Uranus_2042-02-12T06_35_40.8000_IRTF.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:29:59 2023

```
target                  : Uranus
target radius (km)      :  25559.00
C/A epoch               : 2042-02-12T06:38:56.590
Event type              : PtRgt
: Uranus occs: topocentric, not geoecetric
: 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          : 660208323904541312
2Mass ID (if available) : 08484528+1830455
ICRS Star Coord at Epoch: 08h 48m 45.27801s +18:30:45.39975s
RUWE (>1.4 is poor)     :   0.99
K magnitude             : 13.660
G magnitude             : 15.583
RP magnitude            : 14.976
BP magnitude            : 16.010
DUPflag                 : 0
Distance (au)           : 17.522
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    : -22.36
Sun-Target sep (deg)    :  166.46
Sun-Moon sep (deg)      :   92.65
B (ring opening deg)    :   37.56
PA of pole (deg)        :   95.21
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  :   2.088
C/A sky separation (km) :  26539.7
NAIF SPICE kernels      : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
```





b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2042-02-12T06:16:55.724		41.42	-28.01	51355.62	-31.23		
lambda	I	2042-02-12T06:17:38.308		41.59	-28.18	50026.71	-31.05		
delta	I	2042-02-12T06:18:34.319		41.81	-28.39	48300.35	-30.59		
gamma	I	2042-02-12T06:18:56.350		41.89	-28.48	47628.57	-30.40		
eta	I	2042-02-12T06:19:11.268		41.95	-28.54	47176.12	-30.26		
beta	I	2042-02-12T06:20:01.339		42.15	-28.73	45669.18	-29.76		
alpha	I	2042-02-12T06:20:33.623		42.27	-28.86	44710.03	-29.45		
4	I	2042-02-12T06:21:45.647		42.55	-29.14	42608.48	-28.56		
5	I	2042-02-12T06:21:57.087		42.60	-29.19	42287.35	-28.38		
6	I	2042-02-12T06:22:10.817		42.65	-29.24	41879.46	-28.24		

No planet occultations

6	E	2042-02-12T06:51:15.234		49.47	-36.07	41834.59	28.29		
5	E	2042-02-12T06:51:29.236		49.53	-36.12	42165.35	28.42		
4	E	2042-02-12T06:51:40.482		49.57	-36.16	42538.33	28.61		
alpha	E	2042-02-12T06:52:56.706		49.87	-36.46	44752.41	29.50		
beta	E	2042-02-12T06:53:27.004		49.99	-36.58	45641.15	29.81		
eta	E	2042-02-12T06:54:17.986		50.19	-36.78	47176.12	30.32		
gamma	E	2042-02-12T06:54:32.920		50.25	-36.84	47629.88	30.45		
delta	E	2042-02-12T06:54:54.867		50.33	-36.93	48300.35	30.65		
lambda	E	2042-02-12T06:55:50.769		50.55	-37.14	50026.71	31.11		
epsilon	E	2042-02-12T06:56:13.783		50.64	-37.23	50744.68	31.30		

Uranus_2042-02-12T06_35_40.8000_RIO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:34:12 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2042-02-12T06:31:06.430
Event type : PtRgt
: Uranus occs: topocentric, not geoecetric
: Ring occs: geocentric, topocentric
Observer code : RIO
Location : Rio de Janeiro
Latitude (deg) : -22.89506
E. Longitude (deg) : 316.77708
Altitude (km) : 0.033
Gaia source ID : 660208323904541312
2Mass ID (if available) : 08484528+1830455
ICRS Star Coord at Epoch: 08h 48m 45.27801s +18:30:45.39975s
RUWE (>1.4 is poor) : 0.99
K magnitude : 13.660
G magnitude : 15.583
RP magnitude : 14.976
BP magnitude : 16.010
DUPflag : 0
Distance (au) : 17.522
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -22.36
Sun-Target sep (deg) : 166.46
Sun-Moon sep (deg) : 92.28
B (ring opening deg) : 37.56
PA of pole (deg) : 95.21
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.998
C/A sky separation (km) : 25396.4
NAIF SPICE kernels : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
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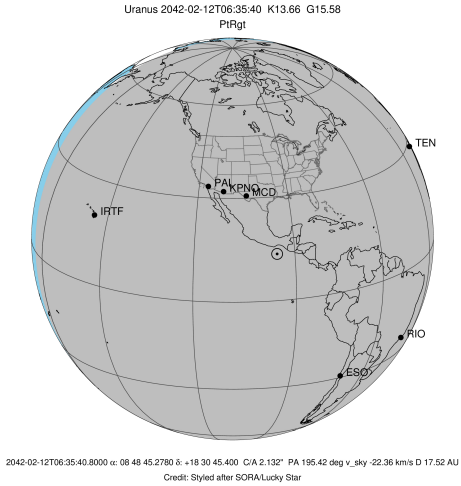
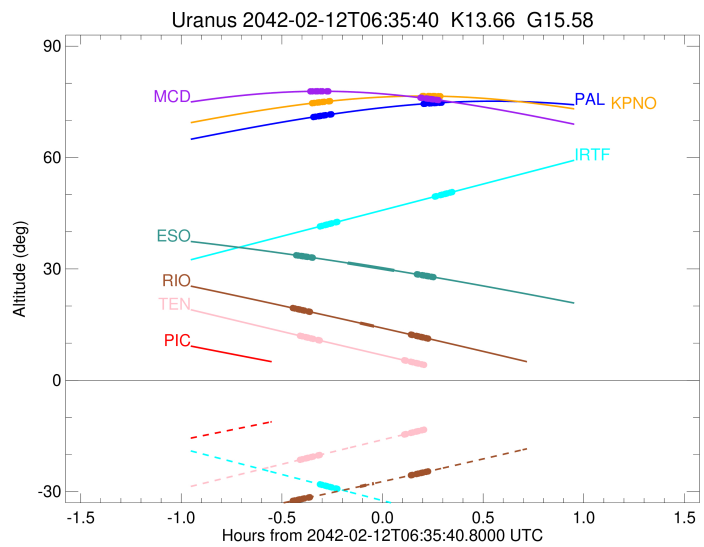
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk



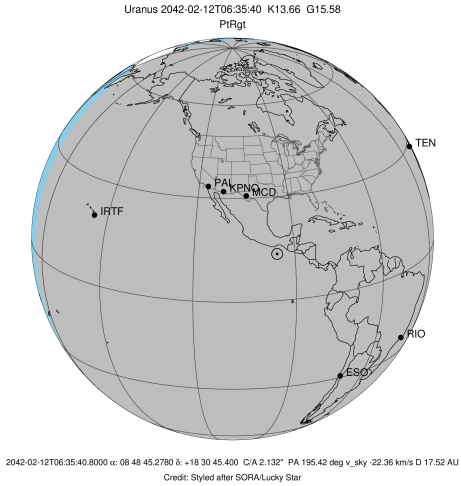


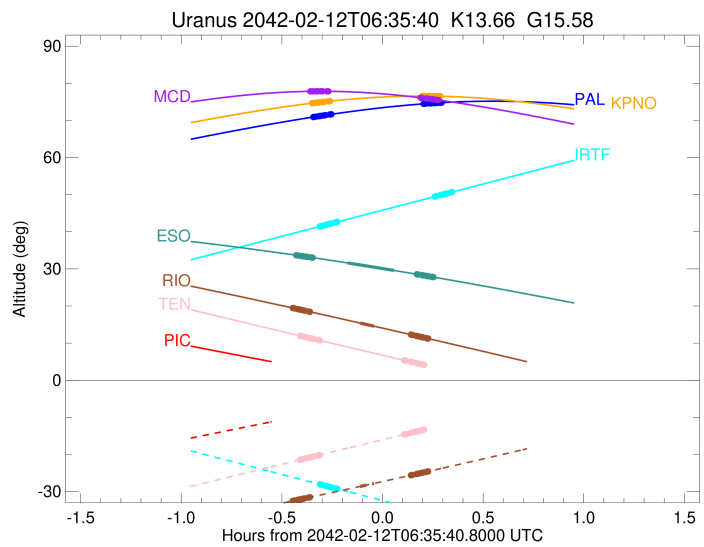
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2042-02-12T06:08:50.255		19.48	-32.50	51366.74	-31.62		
lambda	I	2042-02-12T06:09:32.660		19.34	-32.37	50026.71	-31.45		
delta	I	2042-02-12T06:10:27.901		19.16	-32.20	48300.35	-31.04		
gamma	I	2042-02-12T06:10:49.609		19.08	-32.13	47628.40	-30.87		
eta	I	2042-02-12T06:11:04.291		19.03	-32.08	47176.12	-30.74		
beta	I	2042-02-12T06:11:53.499		18.87	-31.92	45669.85	-30.30		
alpha	I	2042-02-12T06:12:25.263		18.77	-31.82	44708.81	-30.01		
4	I	2042-02-12T06:13:35.706		18.53	-31.60	42609.48	-29.22		
5	I	2042-02-12T06:13:46.775		18.49	-31.56	42289.78	-29.06		
6	I	2042-02-12T06:14:00.333		18.45	-31.52	41879.22	-28.94		
Uranus	I	2042-02-12T06:28:58.824		15.42	-28.61	25558.27		2.64	2.77
Uranus	E	2042-02-12T06:33:07.689		14.57	-27.80	25542.55		12.56	13.13
6	E	2042-02-12T06:44:07.980		12.30	-25.60	41833.26	28.87		
5	E	2042-02-12T06:44:21.713		12.25	-25.55	42164.15	28.99		
4	E	2042-02-12T06:44:32.736		12.22	-25.51	42537.39	29.15		
alpha	E	2042-02-12T06:45:47.712		11.96	-25.26	44752.37	29.93		
beta	E	2042-02-12T06:46:17.588		11.85	-25.16	45641.11	30.21		
eta	E	2042-02-12T06:47:07.951		11.68	-24.99	47176.12	30.65		
gamma	E	2042-02-12T06:47:22.721		11.63	-24.94	47629.78	30.78		
delta	E	2042-02-12T06:47:44.450		11.55	-24.87	48300.35	30.95		
lambda	E	2042-02-12T06:48:39.865		11.36	-24.68	50026.71	31.35		
epsilon	E	2042-02-12T06:49:02.689		11.28	-24.60	50744.09	31.52		

Uranus_2042-02-12T06_35_40.8000_ESO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:36:23 2023

```
target                  : Uranus
target radius (km)      :  25559.00
C/A epoch               : 2042-02-12T06:32:16.480
Event type              : PtRgt
: Uranus occs: topocentric, not geoecetric
: Ring occs: geocentric, topocentric
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          : 660208323904541312
2Mass ID (if available) : 08484528+1830455
ICRS Star Coord at Epoch: 08h 48m 45.27801s +18:30:45.39975s
RUWE (>1.4 is poor)     :   0.99
K magnitude             : 13.660
G magnitude             : 15.583
RP magnitude            : 14.976
BP magnitude            : 16.010
DUPflag                 : 0
Distance (au)           : 17.522
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    : -22.36
Sun-Target sep (deg)    :  166.46
Sun-Moon sep (deg)      :   92.51
B (ring opening deg)    :   37.56
PA of pole (deg)        :   95.21
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  :   1.867
C/A sky separation (km) :  23720.5
NAIF SPICE kernels      : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
```





b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2042-02-12T06:09:50.544		33.69	-43.79	51379.47	-32.49		
lambda	I	2042-02-12T06:10:32.199		33.60	-43.73	50026.71	-32.35		
delta	I	2042-02-12T06:11:25.855		33.49	-43.65	48300.35	-31.99		
gamma	I	2042-02-12T06:11:46.912		33.44	-43.61	47628.20	-31.85		
eta	I	2042-02-12T06:12:01.131		33.41	-43.59	47176.12	-31.74		
beta	I	2042-02-12T06:12:48.706		33.30	-43.52	45670.63	-31.36		
alpha	I	2042-02-12T06:13:19.451		33.24	-43.47	44707.35	-31.12		
4	I	2042-02-12T06:14:27.141		33.09	-43.36	42610.62	-30.45		
5	I	2042-02-12T06:14:37.631		33.06	-43.34	42292.60	-30.30		
6	I	2042-02-12T06:14:50.815		33.03	-43.32	41878.83	-30.21		
Uranus	I	2042-02-12T06:25:17.450		31.60	-42.25	25549.53		-9.49	-9.93
Uranus	E	2042-02-12T06:39:09.741		29.58	-40.67	25499.98		24.35	25.35
6	E	2042-02-12T06:45:54.443		28.56	-39.84	41831.14	30.16		
5	E	2042-02-12T06:46:07.603		28.52	-39.81	42162.38	30.25		
4	E	2042-02-12T06:46:18.164		28.50	-39.79	42535.96	30.39		
alpha	E	2042-02-12T06:47:30.270		28.31	-39.63	44752.25	31.06		
beta	E	2042-02-12T06:47:59.083		28.24	-39.57	45641.06	31.30		
eta	E	2042-02-12T06:48:47.755		28.11	-39.47	47176.12	31.68		
gamma	E	2042-02-12T06:49:02.049		28.08	-39.44	47629.61	31.78		
delta	E	2042-02-12T06:49:23.105		28.02	-39.39	48300.35	31.93		
lambda	E	2042-02-12T06:50:16.878		27.88	-39.28	50026.71	32.28		
epsilon	E	2042-02-12T06:50:39.041		27.82	-39.23	50743.57	32.41		