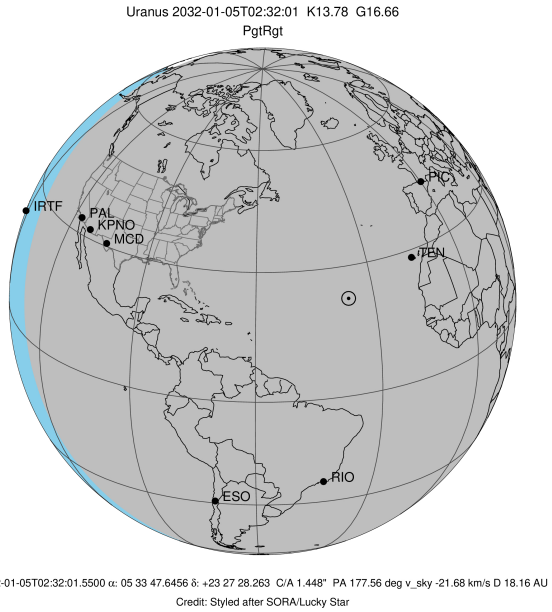
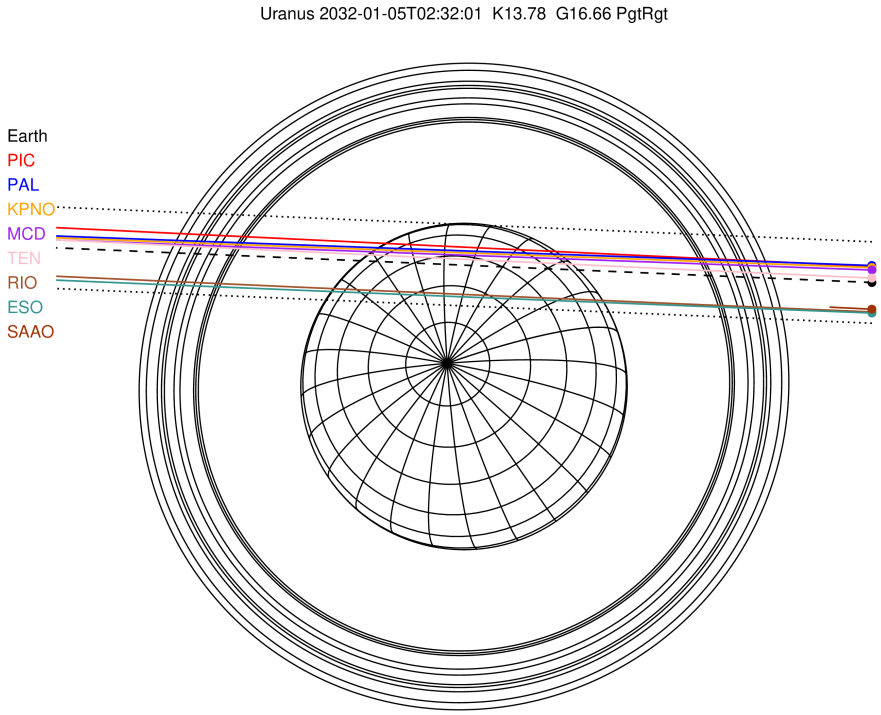
Stellar occultation prediction by rfrench@wellesley.edu Sun Jun 25 00:23:58 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2032-01-05T02:32:01.550
Event type : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Gaia source ID : 3404539422134616832
2Mass ID (if available) : 05334764+2327284

ICRS Star Coord at Epoch: 05h 33m 47.64561s +23:27:28.26267s
RUWE (>1.4 is poor) : 0.99
K magnitude : 13.778
G magnitude : 16.664
RP magnitude : 15.806
BP magnitude : 17.417
DUPflag : 0
Distance (au) : 18.156
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -21.68
Sun-Target sep (deg) : 160.15
Sun-Moon sep (deg) : 100.54
B (ring opening deg) : 79.90
PA of pole (deg) : 36.03

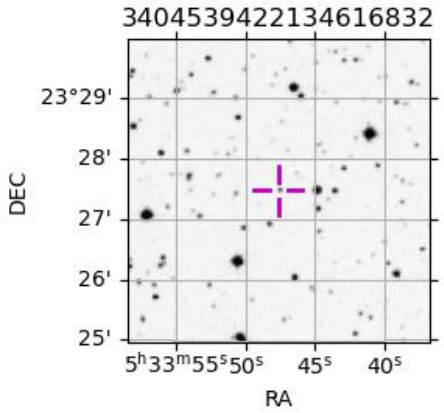
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



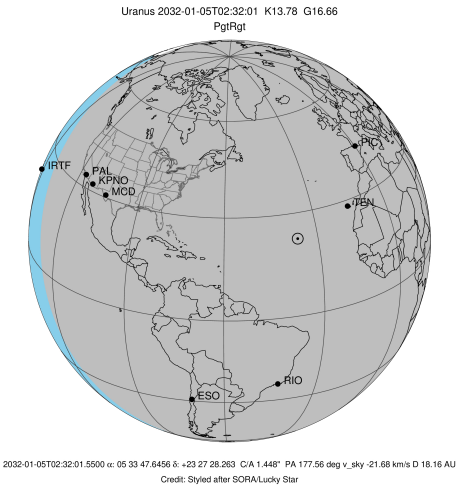


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

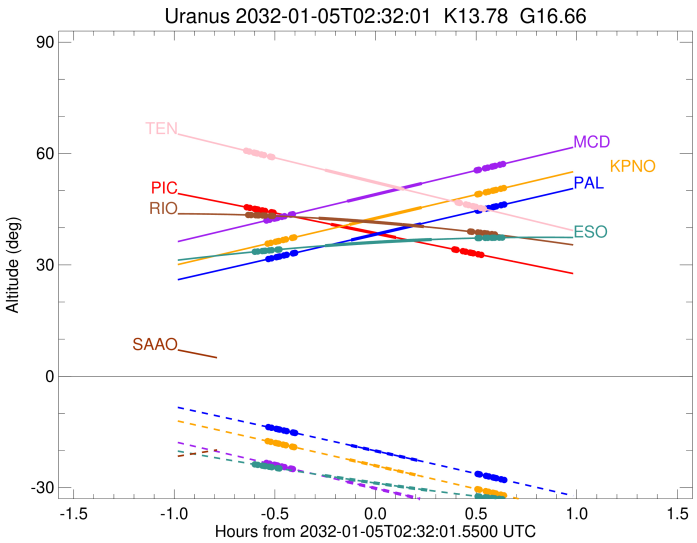
Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	++++++++++	+ +	++++++++++	JAN 05 01:53 - JAN 05 03:03	PieRie
PAL	Palomar Mt (200")	33.4	243.1	++++++++++	+ +	++++++++++	JAN 05 01:59 - JAN 05 03:10	PieRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	++++++++++	+ +	++++++++++	JAN 05 01:59 - JAN 05 03:09	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	++++++++++	+ +	++++++++++	JAN 05 01:59 - JAN 05 03:09	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5	++++++++++	+ +	++++++++++	JAN 05 01:53 - JAN 05 03:03	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	++++++++++	+ +	++++++++++	JAN 05 01:53 - JAN 05 03:07	PieRie
ESO	European Southern Obs	-29.3	289.3	++++++++++	+ +	++++++++++	JAN 05 01:55 - JAN 05 03:09	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_2032-01-05T02_32_01.5500_PIC.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:15:55 2023



target : Uranus
target radius (km) : 25559.00
C/A epoch : 2032-01-05T02:28:48.990
Event type : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code : PIC
Location : Pic du Midi
Latitude (deg) : 42.93656
E. Longitude (deg) : 0.14231
Altitude (km) : 2.890
Gaia source ID : 3404539422134616832
2Mass ID (if available) : 05334764+2327284
ICRS Star Coord at Epoch: 05h 33m 47.64561s +23:27:28.26267s
RUWE (>1.4 is poor) : 0.99
K magnitude : 13.778
G magnitude : 16.664
RP magnitude : 15.806
BP magnitude : 17.417
DUPflag : 0
Distance (au) : 18.156
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -21.68
Sun-Target sep (deg) : 160.15
Sun-Moon sep (deg) : 101.22
B (ring opening deg) : 79.90
PA of pole (deg) : 36.03
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.655
C/A sky separation (km) : 21798.5
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

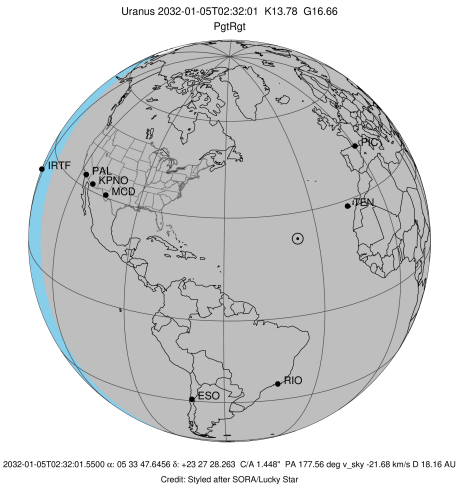


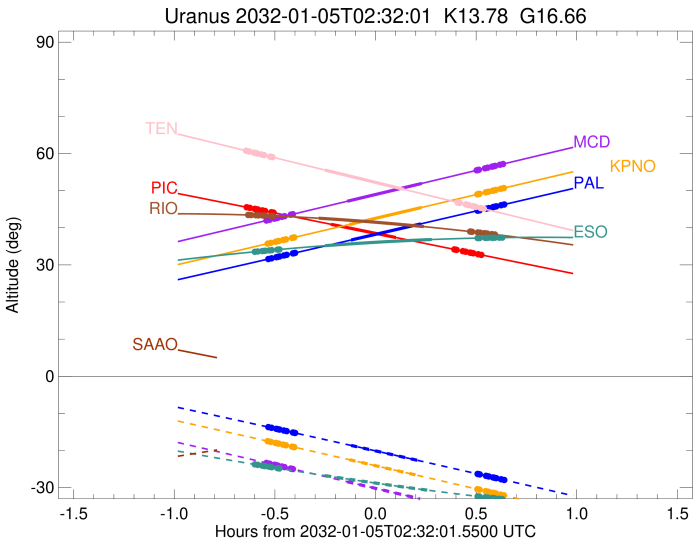
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-05T01:53:24.013		45.57	-59.78	51429.54	-19.87		
lambda	I	2032-01-05T01:54:34.654		45.36	-59.59	50026.71	-19.79		
delta	I	2032-01-05T01:56:02.257		45.09	-59.37	48300.35	-19.62		
gamma	I	2032-01-05T01:56:36.664		44.99	-59.28	47626.64	-19.54		
eta	I	2032-01-05T01:56:59.747		44.92	-59.22	47176.12	-19.49		
beta	I	2032-01-05T01:58:16.800		44.68	-59.02	45681.18	-19.31		
alpha	I	2032-01-05T01:59:05.393		44.54	-58.89	44746.33	-19.18		
4	I	2032-01-05T02:01:00.247		44.19	-58.59	42561.27	-18.87		
5	I	2032-01-05T02:01:21.800		44.12	-58.53	42154.94	-18.79		
6	I	2032-01-05T02:01:39.226		44.07	-58.49	41829.31	-18.72		
Uranus	I	2032-01-05T02:18:44.924		40.94	-55.71	25490.37		3.44	3.61
Uranus	E	2032-01-05T02:38:09.474		37.37	-52.41	25005.94		9.97	10.43
6	E	2032-01-05T02:55:29.211		34.18	-49.38	41803.30	18.66		
5	E	2032-01-05T02:55:54.603		34.10	-49.31	42275.10	18.72		
4	E	2032-01-05T02:56:13.056		34.05	-49.25	42615.03	18.80		
alpha	E	2032-01-05T02:58:02.221		33.71	-48.93	44687.59	19.11		
beta	E	2032-01-05T02:58:52.587		33.56	-48.78	45651.71	19.24		
eta	E	2032-01-05T03:00:11.442		33.32	-48.55	47176.12	19.41		
gamma	E	2032-01-05T03:00:34.811		33.25	-48.48	47630.40	19.47		
delta	E	2032-01-05T03:01:09.165		33.14	-48.38	48300.35	19.54		
lambda	E	2032-01-05T03:02:37.135		32.87	-48.12	50026.71	19.71		
epsilon	E	2032-01-05T03:03:13.525		32.76	-48.01	50745.11	19.78		

Uranus_2032-01-05T02_32_01.5500_PAL.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:18:00 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2032-01-05T02:35:31.790
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 : 3404539422134616832
2Mass ID (if available) : 05334764+2327284
ICRS Star Coord at Epoch: 05h 33m 47.64561s +23:27:28.26267s
RUWE (>1.4 is poor) : 0.99
K magnitude : 13.778
G magnitude : 16.664
RP magnitude : 15.806
BP magnitude : 17.417
DUPflag : 0
Distance (au) : 18.156
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -21.68
Sun-Target sep (deg) : 160.15
Sun-Moon sep (deg) : 100.98
B (ring opening deg) : 79.90
PA of pole (deg) : 36.03
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.612
C/A sky separation (km) : 21222.5
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



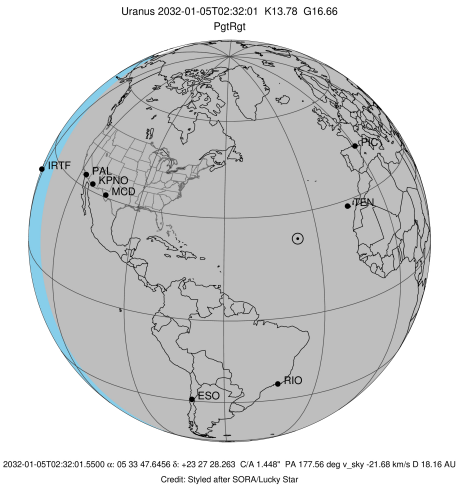


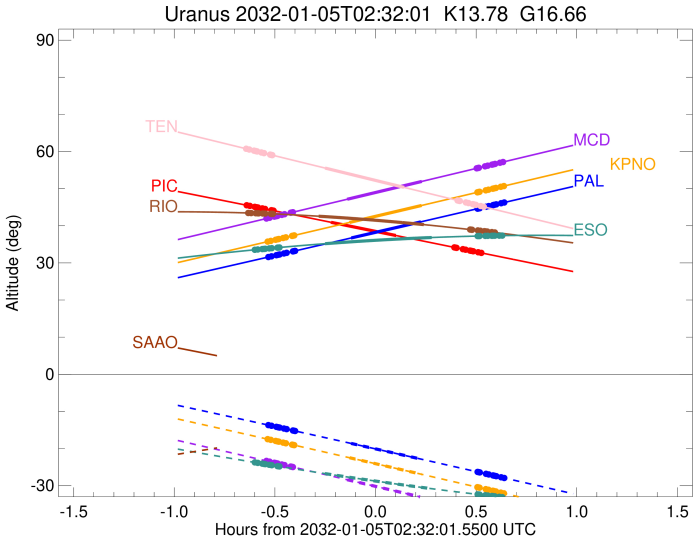
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-05T01:59:51.411		31.53	-13.65	51429.92	-19.91		
lambda	I	2032-01-05T02:01:01.920		31.78	-13.88	50026.71	-19.84		
delta	I	2032-01-05T02:02:29.279		32.08	-14.17	48300.35	-19.68		
gamma	I	2032-01-05T02:03:03.573		32.20	-14.28	47626.63	-19.61		
eta	I	2032-01-05T02:03:26.572		32.28	-14.36	47176.12	-19.56		
beta	I	2032-01-05T02:04:43.311		32.54	-14.61	45681.17	-19.39		
alpha	I	2032-01-05T02:05:31.671		32.71	-14.77	44746.40	-19.28		
4	I	2032-01-05T02:07:25.889		33.10	-15.15	42561.05	-18.99		
5	I	2032-01-05T02:07:47.290		33.18	-15.23	42154.92	-18.91		
6	I	2032-01-05T02:08:04.587		33.24	-15.28	41829.53	-18.85		
Uranus	I	2032-01-05T02:24:45.355		36.71	-18.63	25501.75		3.14	3.29
Uranus	E	2032-01-05T02:45:35.283		41.07	-22.85	24997.67		10.04	10.51
6	E	2032-01-05T03:02:25.021		44.60	-26.30	41804.02	18.92		
5	E	2032-01-05T03:02:50.144		44.68	-26.38	42276.96	18.98		
4	E	2032-01-05T03:03:08.220		44.75	-26.44	42614.70	19.05		
alpha	E	2032-01-05T03:04:56.000		45.12	-26.81	44687.24	19.35		
beta	E	2032-01-05T03:05:45.752		45.30	-26.98	45651.26	19.47		
eta	E	2032-01-05T03:07:03.706		45.57	-27.25	47176.12	19.64		
gamma	E	2032-01-05T03:07:26.804		45.65	-27.33	47630.32	19.69		
delta	E	2032-01-05T03:08:00.774		45.77	-27.45	48300.35	19.76		
lambda	E	2032-01-05T03:09:27.777		46.07	-27.74	50026.71	19.92		
epsilon	E	2032-01-05T03:10:03.738		46.20	-27.87	50744.37	19.99		

Uranus_2032-01-05T02_32_01.5500_KPNO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:22:19 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2032-01-05T02:35:22.220
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 : 3404539422134616832
2Mass ID (if available) : 05334764+2327284
ICRS Star Coord at Epoch: 05h 33m 47.64561s +23:27:28.26267s
RUWE (>1.4 is poor) : 0.99
K magnitude : 13.778
G magnitude : 16.664
RP magnitude : 15.806
BP magnitude : 17.417
DUPflag : 0
Distance (au) : 18.156
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -21.68
Sun-Target sep (deg) : 160.15
Sun-Moon sep (deg) : 101.03
B (ring opening deg) : 79.90
PA of pole (deg) : 36.03
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.588
C/A sky separation (km) : 20916.2
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



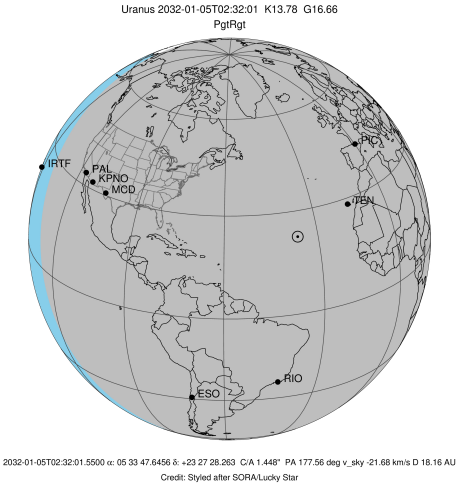


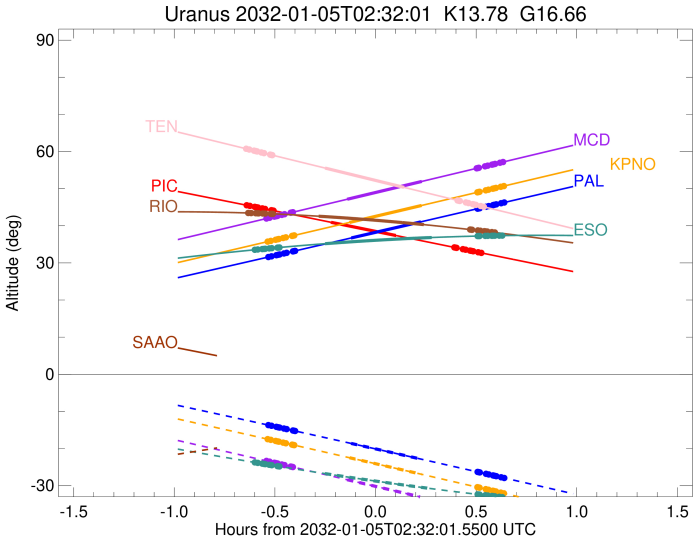
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-05T01:59:38.952	35.68	-17.43	51431.92	-20.00			
lambda	I	2032-01-05T02:00:49.229	35.93	-17.67	50026.71	-19.94			
delta	I	2032-01-05T02:02:16.155	36.24	-17.96	48300.35	-19.78			
gamma	I	2032-01-05T02:02:50.273	36.36	-18.08	47626.59	-19.72			
eta	I	2032-01-05T02:03:13.150	36.44	-18.16	47176.12	-19.67			
beta	I	2032-01-05T02:04:29.470	36.71	-18.42	45681.16	-19.50			
alpha	I	2032-01-05T02:05:17.545	36.88	-18.58	44746.55	-19.39			
4	I	2032-01-05T02:07:11.091	37.28	-18.97	42560.68	-19.11			
5	I	2032-01-05T02:07:32.334	37.35	-19.04	42154.89	-19.04			
6	I	2032-01-05T02:07:49.500	37.41	-19.10	41829.89	-18.98			
Uranus	I	2032-01-05T02:24:15.689	40.90	-22.48	25509.14		2.93	3.07	
Uranus	E	2032-01-05T02:45:46.496	45.47	-26.94	24995.30		10.06	10.53	
6	E	2032-01-05T03:02:21.579	49.01	-30.41	41804.24	19.04			
5	E	2032-01-05T03:02:46.561	49.09	-30.50	42277.52	19.10			
4	E	2032-01-05T03:03:04.484	49.16	-30.56	42614.59	19.17			
alpha	E	2032-01-05T03:04:51.623	49.54	-30.93	44687.14	19.46			
beta	E	2032-01-05T03:05:41.098	49.71	-31.11	45651.13	19.57			
eta	E	2032-01-05T03:06:58.647	49.99	-31.38	47176.12	19.74			
gamma	E	2032-01-05T03:07:21.626	50.07	-31.46	47630.29	19.79			
delta	E	2032-01-05T03:07:55.429	50.19	-31.58	48300.35	19.86			
lambda	E	2032-01-05T03:09:22.017	50.50	-31.88	50026.71	20.02			
epsilon	E	2032-01-05T03:09:57.807	50.63	-32.01	50744.21	20.08			

Uranus_2032-01-05T02_32_01.5500_MCD.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:24:31 2023

```
target                  : Uranus
target radius (km)      :  25559.00
C/A epoch               : 2032-01-05T02:35:03.140
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          : 3404539422134616832
2Mass ID (if available) : 05334764+2327284
ICRS Star Coord at Epoch: 05h 33m 47.64561s +23:27:28.26267s
RUWE (>1.4 is poor)     :   0.99
K magnitude             : 13.778
G magnitude             : 16.664
RP magnitude            : 15.806
BP magnitude            : 17.417
DUPflag                 : 0
Distance (au)           : 18.156
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    : -21.68
Sun-Target sep (deg)    :  160.15
Sun-Moon sep (deg)      :  101.11
B (ring opening deg)    :   79.90
PA of pole (deg)        :   36.03
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  :   1.561
C/A sky separation (km) :  20554.9
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
```



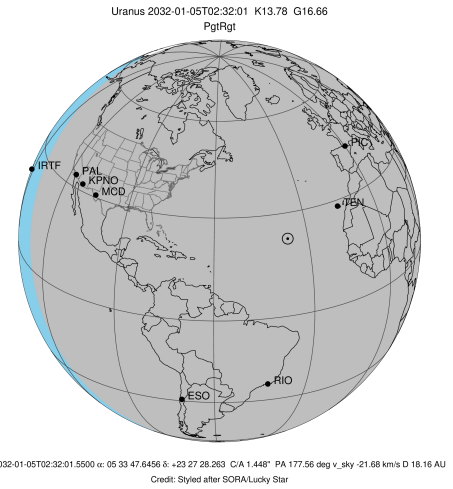


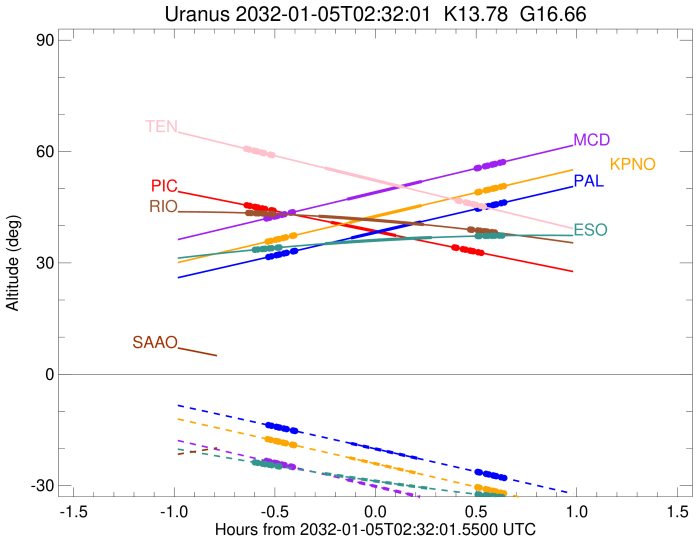
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-05T01:59:17.108		41.91	-23.29	51434.31	-20.12		
lambda	I	2032-01-05T02:00:27.099		42.16	-23.54	50026.71	-20.05		
delta	I	2032-01-05T02:01:53.501		42.47	-23.84	48300.35	-19.90		
gamma	I	2032-01-05T02:02:27.409		42.59	-23.96	47626.54	-19.84		
eta	I	2032-01-05T02:02:50.138		42.67	-24.04	47176.12	-19.80		
beta	I	2032-01-05T02:04:05.955		42.94	-24.30	45681.14	-19.64		
alpha	I	2032-01-05T02:04:53.689		43.11	-24.47	44746.74	-19.53		
4	I	2032-01-05T02:06:46.434		43.52	-24.86	42560.22	-19.26		
5	I	2032-01-05T02:07:07.488		43.59	-24.94	42154.86	-19.19		
6	I	2032-01-05T02:07:24.500		43.65	-25.00	41830.33	-19.13		
Uranus	I	2032-01-05T02:23:34.360		47.14	-28.40	25517.05		2.69	2.82
Uranus	E	2032-01-05T02:45:50.465		51.95	-33.13	24993.27		10.08	10.55
6	E	2032-01-05T03:02:09.219		55.47	-36.61	41804.49	19.19		
5	E	2032-01-05T03:02:34.035		55.56	-36.70	42278.16	19.24		
4	E	2032-01-05T03:02:51.781		55.62	-36.76	42614.47	19.31		
alpha	E	2032-01-05T03:04:38.171		56.01	-37.14	44687.03	19.59		
beta	E	2032-01-05T03:05:27.320		56.18	-37.31	45650.99	19.70		
eta	E	2032-01-05T03:06:44.393		56.46	-37.59	47176.12	19.86		
gamma	E	2032-01-05T03:07:07.233		56.54	-37.67	47630.27	19.91		
delta	E	2032-01-05T03:07:40.839		56.66	-37.79	48300.35	19.97		
lambda	E	2032-01-05T03:09:06.940		56.97	-38.10	50026.71	20.13		
epsilon	E	2032-01-05T03:09:42.528		57.10	-38.22	50744.05	20.19		

Uranus_2032-01-05T02_32_01.5500_TEN.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:26:39 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2032-01-05T02:29:05.250
Event type : PgtRgt
: Uranus occs: geocentric, topocentric
: 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 : 3404539422134616832
2Mass ID (if available) : 05334764+2327284
ICRS Star Coord at Epoch: 05h 33m 47.64561s +23:27:28.26267s
RUWE (>1.4 is poor) : 0.99
K magnitude : 13.778
G magnitude : 16.664
RP magnitude : 15.806
BP magnitude : 17.417
DUPflag : 0
Distance (au) : 18.156
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -21.68
Sun-Target sep (deg) : 160.15
Sun-Moon sep (deg) : 101.36
B (ring opening deg) : 79.90
PA of pole (deg) : 36.03
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.512
C/A sky separation (km) : 19909.8
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



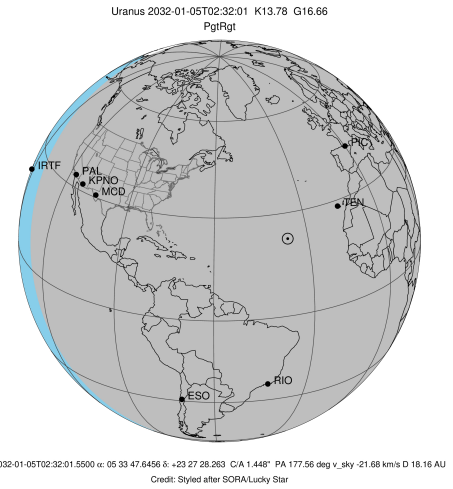


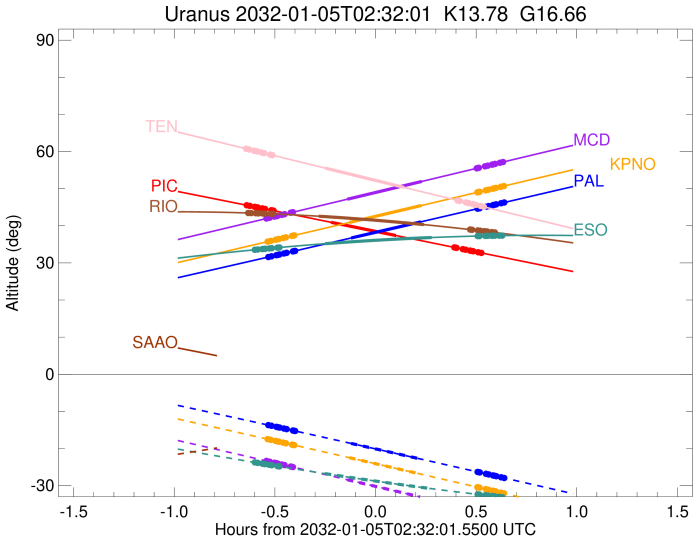
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-05T01:53:14.554	60.80	-79.01	51441.11	-20.36			
lambda	I	2032-01-05T01:54:24.055	60.54	-78.78	50026.71	-20.30			
delta	I	2032-01-05T01:55:49.413	60.23	-78.50	48300.35	-20.15			
gamma	I	2032-01-05T01:56:22.907	60.10	-78.39	47626.41	-20.09			
eta	I	2032-01-05T01:56:45.344	60.02	-78.32	47176.12	-20.05			
beta	I	2032-01-05T01:58:00.190	59.75	-78.07	45681.09	-19.90			
alpha	I	2032-01-05T01:58:47.267	59.57	-77.91	44747.22	-19.79			
4	I	2032-01-05T02:00:38.531	59.16	-77.53	42559.03	-19.54			
5	I	2032-01-05T02:00:59.217	59.09	-77.46	42154.82	-19.47			
6	I	2032-01-05T02:01:15.932	59.03	-77.41	41831.49	-19.42			
Uranus	I	2032-01-05T02:16:58.812	55.55	-74.14	25531.38		2.18	2.29	
Uranus	E	2032-01-05T02:40:32.289	50.35	-69.09	24991.64		10.10	10.57	
6	E	2032-01-05T02:56:27.932	46.84	-65.62	41804.71	19.36			
5	E	2032-01-05T02:56:52.554	46.75	-65.53	42278.69	19.41			
4	E	2032-01-05T02:57:10.115	46.68	-65.46	42614.36	19.47			
alpha	E	2032-01-05T02:58:55.705	46.29	-65.08	44686.95	19.72			
beta	E	2032-01-05T02:59:44.526	46.11	-64.90	45650.88	19.83			
eta	E	2032-01-05T03:01:01.142	45.83	-64.62	47176.12	19.97			
gamma	E	2032-01-05T03:01:23.855	45.75	-64.54	47630.25	20.02			
delta	E	2032-01-05T03:01:57.285	45.63	-64.41	48300.35	20.07			
lambda	E	2032-01-05T03:03:22.978	45.31	-64.10	50026.71	20.22			
epsilon	E	2032-01-05T03:03:58.411	45.18	-63.97	50743.97	20.27			

Uranus_2032-01-05T02_32_01.5500_RIO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:32:59 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2032-01-05T02:30:59.410
Event type : PgtRgt
: Uranus occs: geocentric, topocentric
: 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 : 3404539422134616832
2Mass ID (if available) : 05334764+2327284
ICRS Star Coord at Epoch: 05h 33m 47.64561s +23:27:28.26267s
RUWE (>1.4 is poor) : 0.99
K magnitude : 13.778
G magnitude : 16.664
RP magnitude : 15.806
BP magnitude : 17.417
DUPflag : 0
Distance (au) : 18.156
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -21.68
Sun-Target sep (deg) : 160.15
Sun-Moon sep (deg) : 101.19
B (ring opening deg) : 79.90
PA of pole (deg) : 36.03
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.094
C/A sky separation (km) : 14404.4
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



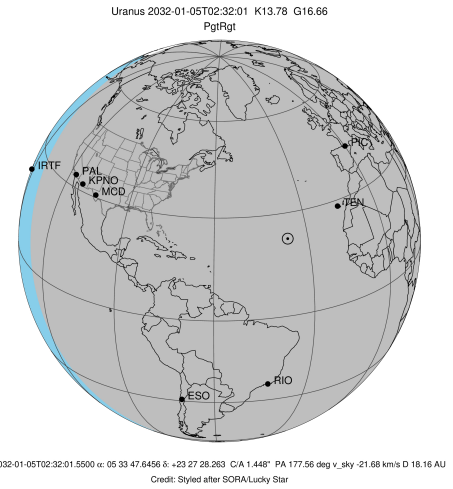


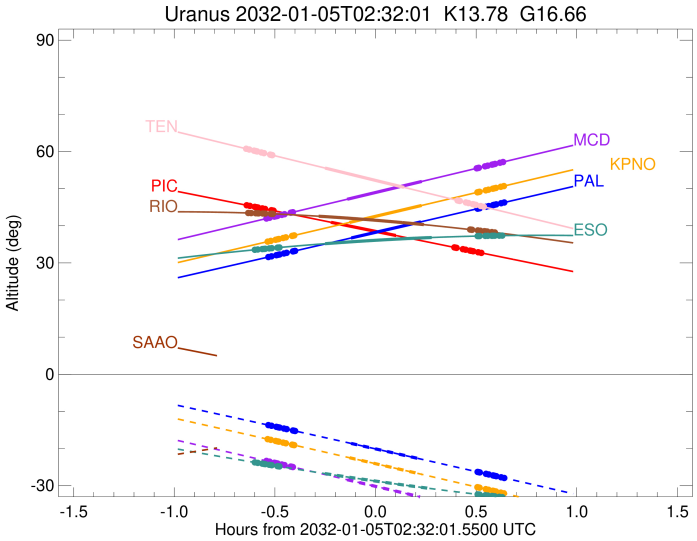
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-05T01:53:50.090		43.45	-41.98	51470.95	-21.30		
lambda	I	2032-01-05T01:54:57.870		43.42	-42.07	50026.71	-21.28		
delta	I	2032-01-05T01:56:19.132		43.38	-42.17	48300.35	-21.21		
gamma	I	2032-01-05T01:56:50.964		43.36	-42.21	47625.76	-21.18		
eta	I	2032-01-05T01:57:12.207		43.35	-42.24	47176.12	-21.16		
beta	I	2032-01-05T01:58:23.016		43.31	-42.32	45680.61	-21.08		
alpha	I	2032-01-05T01:59:07.282		43.29	-42.38	44749.35	-21.03		
4	I	2032-01-05T02:00:52.017		43.23	-42.50	42553.07	-20.90		
5	I	2032-01-05T02:01:11.004		43.21	-42.53	42155.60	-20.87		
6	I	2032-01-05T02:01:26.395		43.20	-42.55	41837.56	-20.84		
Uranus	I	2032-01-05T02:15:04.238		42.58	-43.40	25555.83		-0.74	-0.77
Uranus	E	2032-01-05T02:46:26.270		40.31	-44.49	25034.70		9.69	10.14
6	E	2032-01-05T03:00:12.221		38.99	-44.58	41809.14	20.81		
5	E	2032-01-05T03:00:35.424		38.95	-44.58	42288.11	20.84		
4	E	2032-01-05T03:00:51.147		38.92	-44.57	42611.87	20.87		
alpha	E	2032-01-05T03:02:30.081		38.75	-44.57	44685.55	20.99		
beta	E	2032-01-05T03:03:15.972		38.67	-44.56	45648.66	21.05		
eta	E	2032-01-05T03:04:28.399		38.54	-44.55	47176.12	21.12		
gamma	E	2032-01-05T03:04:49.868		38.50	-44.55	47629.77	21.14		
delta	E	2032-01-05T03:05:21.567		38.44	-44.54	48300.35	21.17		
lambda	E	2032-01-05T03:06:42.976		38.30	-44.53	50026.71	21.24		
epsilon	E	2032-01-05T03:07:16.749		38.23	-44.52	50744.54	21.26		

Uranus_2032-01-05T02_32_01.5500_ESO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:35:09 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2032-01-05T02:33:05.980
Event type : PgtRgt
: Uranus occs: geocentric, topocentric
: 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 : 3404539422134616832
2Mass ID (if available) : 05334764+2327284
ICRS Star Coord at Epoch: 05h 33m 47.64561s +23:27:28.26267s
RUWE (>1.4 is poor) : 0.99
K magnitude : 13.778
G magnitude : 16.664
RP magnitude : 15.806
BP magnitude : 17.417
DUPflag : 0
Distance (au) : 18.156
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -21.68
Sun-Target sep (deg) : 160.15
Sun-Moon sep (deg) : 101.04
B (ring opening deg) : 79.90
PA of pole (deg) : 36.03
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.065
C/A sky separation (km) : 14021.5
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	2032-01-05T01:55:48.029		33.51	-23.70	51472.04	-21.30		
lambda	I	2032-01-05T01:56:55.864		33.61	-23.87	50026.71	-21.28		
delta	I	2032-01-05T01:58:17.114		33.73	-24.08	48300.35	-21.21		
gamma	I	2032-01-05T01:58:48.936		33.77	-24.16	47625.73	-21.19		
eta	I	2032-01-05T01:59:10.169		33.80	-24.21	47176.12	-21.17		
beta	I	2032-01-05T02:00:20.939		33.90	-24.38	45680.58	-21.10		
alpha	I	2032-01-05T02:01:05.166		33.97	-24.49	44749.42	-21.05		
4	I	2032-01-05T02:02:49.804		34.11	-24.75	42552.81	-20.93		
5	I	2032-01-05T02:03:08.750		34.14	-24.79	42155.68	-20.90		
6	I	2032-01-05T02:03:24.111		34.16	-24.83	41837.83	-20.87		
Uranus	I	2032-01-05T02:16:58.080		35.17	-26.76	25554.46		-0.88	-0.93
Uranus	E	2032-01-05T02:48:45.781		36.84	-30.82	25041.56		9.63	10.07
6	E	2032-01-05T03:02:26.206		37.23	-32.35	41809.56	20.89		
5	E	2032-01-05T03:02:49.345		37.24	-32.39	42288.89	20.91		
4	E	2032-01-05T03:03:04.953		37.24	-32.41	42611.60	20.95		
alpha	E	2032-01-05T03:04:43.555		37.27	-32.59	44685.45	21.06		
beta	E	2032-01-05T03:05:29.293		37.29	-32.67	45648.46	21.11		
eta	E	2032-01-05T03:06:41.504		37.31	-32.79	47176.12	21.18		
gamma	E	2032-01-05T03:07:02.906		37.31	-32.83	47629.72	21.20		
delta	E	2032-01-05T03:07:34.513		37.32	-32.88	48300.35	21.23		
lambda	E	2032-01-05T03:08:55.688		37.34	-33.02	50026.71	21.30		
epsilon	E	2032-01-05T03:09:29.384		37.35	-33.07	50744.90	21.32		