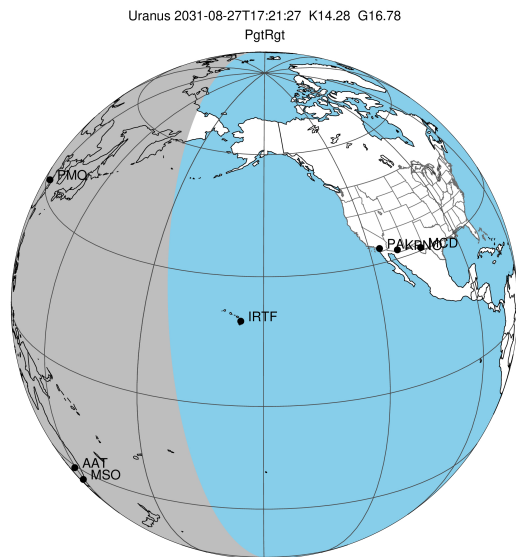


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-27T17:21:27.830  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3428368480511030016  
 2Mass ID (if available) : 05433979+2330365

Uranus 2031-08-27T17:21:27 K14.28 G16.78 PgtRgt

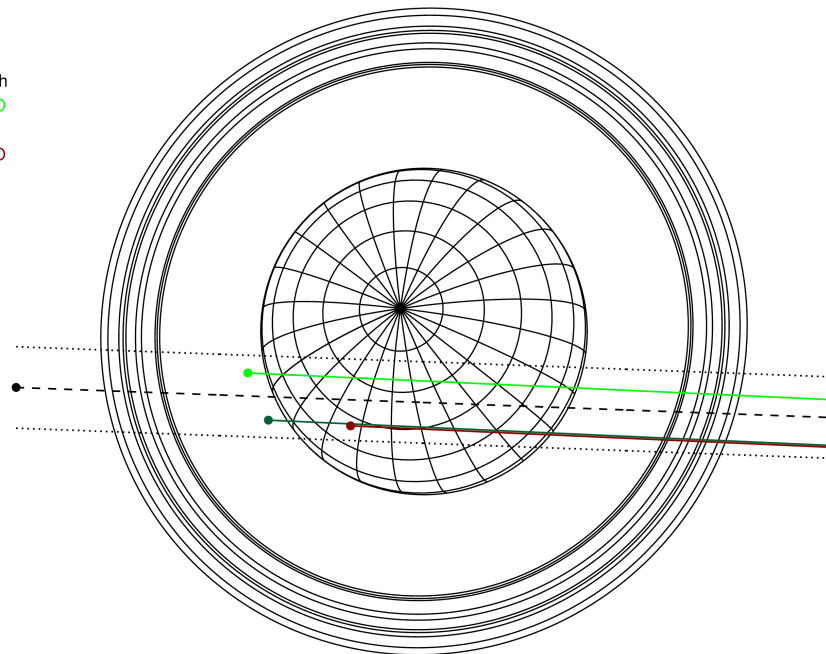
ICRS Star Coord at Epoch: 05h 43m 39.80659s +23:30:36.47883s

RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.283  
 G magnitude : 16.781  
 RP magnitude : 16.010  
 BP magnitude : 17.415  
 DUPflag : 0  
 Distance (au) : 19.470  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 17.70  
 Sun-Target sep (deg) : 67.56  
 Sun-Moon sep (deg) : 175.60  
 B (ring opening deg) : 78.37  
 PA of pole (deg) : 45.76



2031-08-27T17:21:27.8300 ex: 05 43 39.8066 s: +23 30 36.479 C/A 0.783° PA 357.88 deg v\_sky +17.70 km/s D 19.47 AU  
 Credit: Styled after SORA/Lucky Star

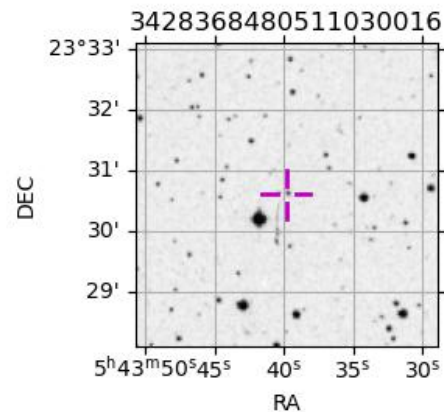
Earth  
 PMO  
 AAT  
 MSO



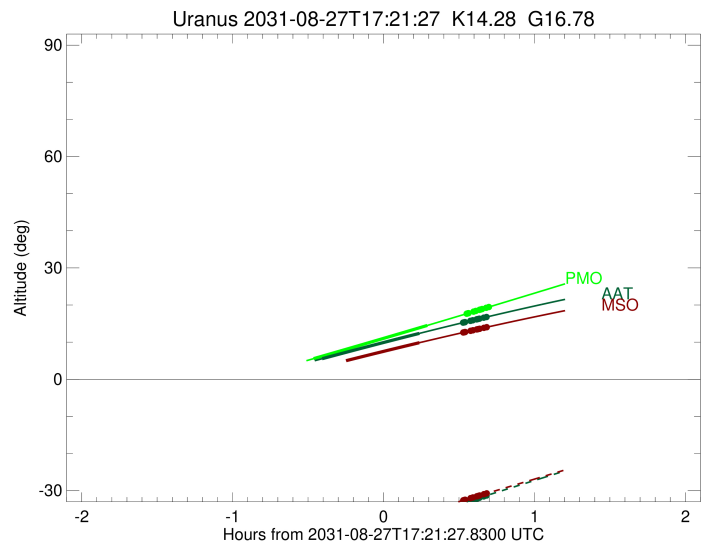
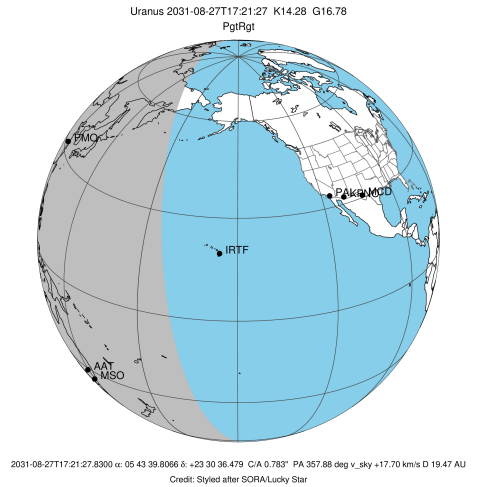
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8		+	+	AUG 27 16:53 - AUG 27 18:02	PieRne
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
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					PnnRnn
ESO	European Southern Obs	-29.3	289.3					PnnRnn
AAT	Siding Spring (AAT)	-31.3	149.1		+	+	AUG 27 16:57 - AUG 27 18:02	PieRne
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0			+	AUG 27 17:35 - AUG 27 18:02	PneRne

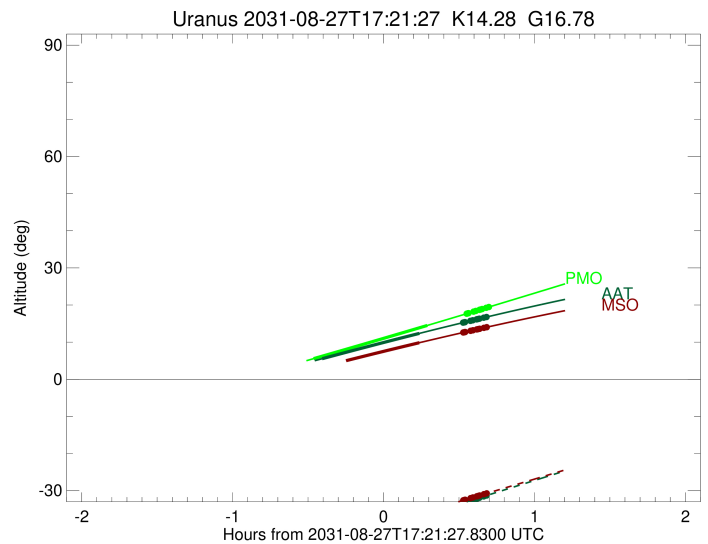
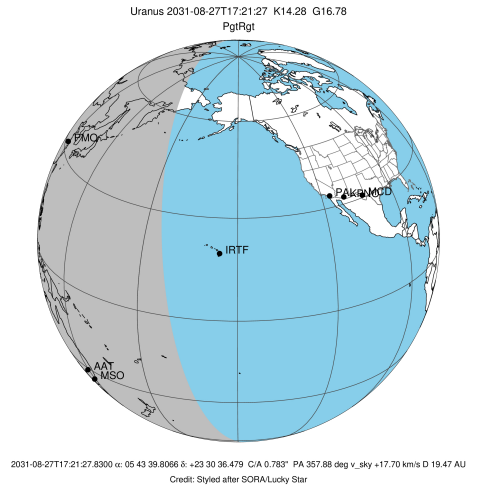


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-27T17:16:24.920  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 3428368480511030016  
 2Mass ID (if available) : 05433979+2330365  
 ICRS Star Coord at Epoch: 05h 43m 39.80659s +23:30:36.47883s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.283  
 G magnitude : 16.781  
 RP magnitude : 16.010  
 BP magnitude : 17.415  
 DUPflag : 0  
 Distance (au) : 19.470  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 17.70  
 Sun-Target sep (deg) : 67.56  
 Sun-Moon sep (deg) : 176.54  
 B (ring opening deg) : 78.37  
 PA of pole (deg) : 45.76  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.548  
 C/A sky separation (km) : 7745.1  
 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



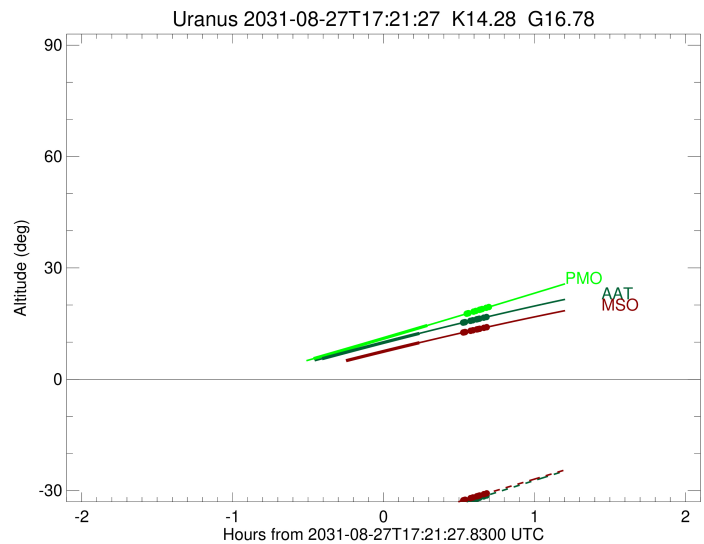
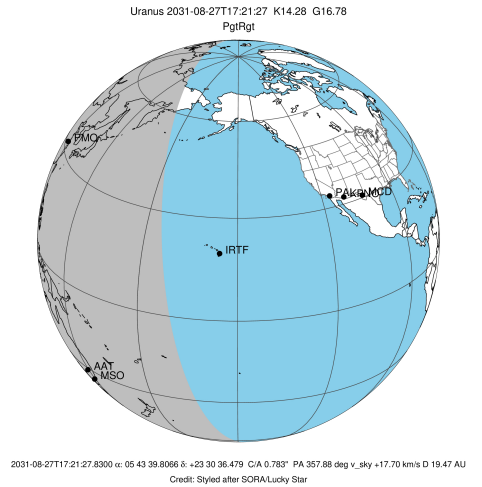
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-08-27T16:29:06.199	0.85x	-47.80	51512.58	-17.81			
lambda	I	2031-08-27T16:30:29.608	1.11x	-47.75	50026.71	-17.81			
delta	I	2031-08-27T16:32:06.615	1.42x	-47.70	48300.35	-17.79			
gamma	I	2031-08-27T16:32:44.358	1.54x	-47.67	47629.19	-17.78			
eta	I	2031-08-27T16:33:09.847	1.62x	-47.66	47176.12	-17.77			
beta	I	2031-08-27T16:34:34.611	1.89x	-47.61	45670.96	-17.75			
alpha	I	2031-08-27T16:35:29.264	2.06x	-47.57	44701.77	-17.74			
4	I	2031-08-27T16:37:27.373	2.44x	-47.49	42608.51	-17.70			
5	I	2031-08-27T16:37:44.399	2.49x	-47.48	42304.26	-17.70			
6	I	2031-08-27T16:38:11.659	2.58x	-47.46	41829.09	-17.70			
Uranus	I	2031-08-27T16:53:41.803	5.56	-46.65	25409.53			5.89	6.17
Uranus	E	2031-08-27T17:38:52.344	14.50	-42.67	25084.89			-10.64	-11.13
6	E	2031-08-27T17:54:31.924	17.67	-40.81	41860.18	17.54			
5	E	2031-08-27T17:54:50.907	17.73	-40.77	42185.32	17.55			
4	E	2031-08-27T17:55:10.402	17.80	-40.73	42527.15	17.55			
alpha	E	2031-08-27T17:57:15.392	18.22	-40.46	44723.97	17.57			
beta	E	2031-08-27T17:58:07.927	18.40	-40.35	45645.95	17.58			
eta	E	2031-08-27T17:59:34.948	18.69	-40.16	47176.12	17.60			
gamma	E	2031-08-27T18:00:00.452	18.78	-40.11	47624.94	17.60			
delta	E	2031-08-27T18:00:38.820	18.91	-40.02	48300.35	17.61			
lambda	E	2031-08-27T18:02:16.838	19.25	-39.81	50026.71	17.62			
epsilon	E	2031-08-27T18:02:57.771	19.38	-39.72	50748.03	17.62			

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-27T17:16:40.070  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 3428368480511030016  
 2Mass ID (if available) : 05433979+2330365  
 ICRS Star Coord at Epoch: 05h 43m 39.80659s +23:30:36.47883s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.283  
 G magnitude : 16.781  
 RP magnitude : 16.010  
 BP magnitude : 17.415  
 DUPflag : 0  
 Distance (au) : 19.470  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 17.70  
 Sun-Target sep (deg) : 67.56  
 Sun-Moon sep (deg) : 175.58  
 B (ring opening deg) : 78.37  
 PA of pole (deg) : 45.76  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.061  
 C/A sky separation (km) : 14977.8  
 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\_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	2031-08-27T16:30:14.925	0.55x	-50.31	51482.20	-17.01			
lambda	I	2031-08-27T16:31:40.505	0.82x	-50.03	50026.71	-16.98			
delta	I	2031-08-27T16:33:22.360	1.14x	-49.69	48300.35	-16.92			
gamma	I	2031-08-27T16:34:02.029	1.26x	-49.56	47629.85	-16.89			
eta	I	2031-08-27T16:34:28.911	1.35x	-49.48	47176.12	-16.87			
beta	I	2031-08-27T16:35:58.518	1.63x	-49.18	45667.94	-16.80			
alpha	I	2031-08-27T16:36:56.408	1.81x	-48.99	44697.05	-16.75			
4	I	2031-08-27T16:39:01.826	2.20x	-48.58	42603.34	-16.63			
5	I	2031-08-27T16:39:19.251	2.26x	-48.52	42310.39	-16.63			
6	I	2031-08-27T16:39:48.119	2.35x	-48.43	41836.76	-16.60			
Uranus	I	2031-08-27T16:57:01.430	5.53	-44.96	25532.07			2.49	2.61
Uranus	E	2031-08-27T17:35:43.506	12.36	-36.96	25000.97			-11.59	-12.12
6	E	2031-08-27T17:53:07.084	15.26	-33.29	41866.24	16.47			
5	E	2031-08-27T17:53:27.601	15.32	-33.22	42197.33	16.49			
4	E	2031-08-27T17:53:47.678	15.37	-33.15	42526.00	16.50			
alpha	E	2031-08-27T17:55:59.893	15.73	-32.68	44718.28	16.61			
beta	E	2031-08-27T17:56:55.659	15.88	-32.49	45644.00	16.65			
eta	E	2031-08-27T17:58:27.507	16.13	-32.16	47176.12	16.72			
gamma	E	2031-08-27T17:58:54.391	16.20	-32.07	47625.76	16.73			
delta	E	2031-08-27T17:59:34.673	16.31	-31.92	48300.35	16.76			
lambda	E	2031-08-27T18:01:17.498	16.59	-31.56	50026.71	16.82			
epsilon	E	2031-08-27T18:02:00.089	16.70	-31.41	50743.51	16.84			

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-27T17:16:52.010  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MSO  
 Location : Mt. Stromlo Observatory  
 Latitude (deg) : -35.32000  
 E. Longitude (deg) : 149.00833  
 Altitude (km) : 0.770  
 Gaia source ID : 3428368480511030016  
 2Mass ID (if available) : 05433979+2330365  
 ICRS Star Coord at Epoch: 05h 43m 39.80659s +23:30:36.47883s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.283  
 G magnitude : 16.781  
 RP magnitude : 16.010  
 BP magnitude : 17.415  
 DUPflag : 0  
 Distance (au) : 19.470  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 17.70  
 Sun-Target sep (deg) : 67.56  
 Sun-Moon sep (deg) : 175.52  
 B (ring opening deg) : 78.37  
 PA of pole (deg) : 45.76  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.082  
 C/A sky separation (km) : 15282.5  
 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\_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	2031-08-27T16:30:32.943	-1.34x	-48.50	51480.63	-16.98			
lambda	I	2031-08-27T16:31:58.581	-1.08x	-48.24	50026.71	-16.95			
delta	I	2031-08-27T16:33:40.630	-0.78x	-47.94	48300.35	-16.88			
gamma	I	2031-08-27T16:34:20.377	-0.66x	-47.82	47629.88	-16.85			
eta	I	2031-08-27T16:34:47.317	-0.58x	-47.74	47176.12	-16.83			
beta	I	2031-08-27T16:36:17.128	-0.31x	-47.46	45667.80	-16.76			
alpha	I	2031-08-27T16:37:15.155	-0.14x	-47.29	44696.85	-16.71			
4	I	2031-08-27T16:39:20.896	0.24x	-46.90	42603.08	-16.59			
5	I	2031-08-27T16:39:38.340	0.29x	-46.85	42310.62	-16.58			
6	I	2031-08-27T16:40:07.275	0.38x	-46.76	41837.12	-16.56			
Uranus	I	2031-08-27T16:57:26.368	3.43x	-43.53	25535.63			2.32	2.43
Uranus	E	2031-08-27T17:35:41.541	9.84	-36.10	24999.72			-11.60	-12.13
6	E	2031-08-27T17:53:10.700	12.60	-32.61	41866.47	16.43			
5	E	2031-08-27T17:53:31.281	12.66	-32.54	42197.85	16.45			
4	E	2031-08-27T17:53:51.379	12.71	-32.48	42525.98	16.46			
alpha	E	2031-08-27T17:56:03.870	13.05	-32.03	44718.05	16.57			
beta	E	2031-08-27T17:56:59.757	13.19	-31.85	45643.93	16.62			
eta	E	2031-08-27T17:58:31.777	13.42	-31.54	47176.12	16.69			
gamma	E	2031-08-27T17:58:58.709	13.49	-31.45	47625.80	16.71			
delta	E	2031-08-27T17:59:39.055	13.60	-31.31	48300.35	16.73			
lambda	E	2031-08-27T18:01:22.036	13.85	-30.97	50026.71	16.79			
epsilon	E	2031-08-27T18:02:04.687	13.96	-30.82	50743.52	16.82			