

# Nature Unbound I - The Glacial cycle.

## Methods and Data

### 1. Data origin

1A. EPICA DOME C Deuterium data Downloaded from:

[ftp://ftp.ncdc.noaa.gov/pub/data/paleo/icecore/antarctica/epica\\_domec/edc3deuttemp2007.txt](ftp://ftp.ncdc.noaa.gov/pub/data/paleo/icecore/antarctica/epica_domec/edc3deuttemp2007.txt)

1B. LR04 Stack Oxygen isotope data

Downloaded from:

<http://www.lorraine-lisiecki.com/LR04stack.txt>

1C. Astronomical data from Laskar 2004 solution

Downloaded as the output from the web interface at:

<http://vo.imcce.fr/insola/earth/online/earth/online/>

With the following settings:

starting time -1 Myr

ending time 0 Myr

sampling step 1000 Years

solar constant 1368 W/m<sup>2</sup>

With eccentricity, climatic precession, obliquity, and insolation marked

With mean daily insolation / mean longitude marked

With latitude on the Earth 65 degrees

With true/mean longitude 90 degrees

### 2. Alignment of interglacials by start time.

For MIS 1, 5, 7e, 9, 11, the zero date was considered when temperatures reached 0° Anomaly during the fast ramp up.

For MIS 7c, 13, 15c, 15a, 17, 19 the highest value at the end of the fast ramp was extrapolated to the average of MIS 1, 5, 7e, and 9, and the time for the average to reach 0° from that temperature value was added to calculate the zero date.

The resulting dates are in a very close agreement with the dates given by

Varga, G. (2015). Changing nature of Pleistocene interglacials—is it recorded by paleosoils in Hungary

(Central Europe)?. Hungarian Geographical Bulletin, 64(4). In his Figure 1b for EPICA Dome C data. Use of

Varga's dates does not significantly alter the results, giving confidence in the alignment presented here.

### 3. Calculation of an average interglacial.

An average interglacial temperature was calculated from MIS 5, 7c, 9, 15a, 15c and 19. MIS 5 was smoothed by linear interpolation to 401 data points using the program Abscissa for Mac OS X to reduce data noise due to a higher frequency of sampling.

Data for every interglacial between +25,000 years and -40,000 years of the determined start date was then interpolated to a data point every 200 years starting at -40,000 years using the following Excel formula:

=FORECAST(NewX,OFFSET(KnownY,MATCH(NewX,KnownX,1)-1,0,2),

OFFSET(KnownX,MATCH(NewX,KnownX,1)-1,0,2))

Average and Standard deviation were then calculated using the corresponding Excel functions.

An average interglacial obliquity and insolation was calculated directly on Excel from the Laskar 2004 output.

Final data is:

# Average interglacial temperature

Relative Time	MIS 5	MIS 7c	MIS 9	MIS 15a	MIS 15c	MIS 19	Average	St. Dev	Avg+STD	Avg-STD
-40000	-6.35084157	-7.683424011	-7.089724013	-7.525166667	-5.9	-8.620924956	-7.195016536	0.977911969	-6.217104567	-8.172928505
-39800	-5.380473836	-7.991053084	-6.605576113	-7.491833333	-5.857063197	-8.624415358	-6.99173537	1.260724875	-5.731010495	-8.252460246
-39600	-5.796281588	-7.563599706	-6.020245521	-7.461335415	-5.801301115	-8.627905579	-6.878448034	1.177935174	-5.70051286	-8.056383208
-39400	-5.385450156	-7.827444816	-5.044468554	-7.491454849	-5.761177645	-8.638460305	-6.691400414	1.483557974	-5.20784244	-8.174958388
-39200	-5.790076279	-8.385535168	-5.163949533	-7.521555184	-5.900898204	-8.659422067	-6.995739406	1.361136206	-5.634603199	-8.356875612
-39000	-4.272289929	-8.871854397	-6.033897632	-7.547796327	-6.040618762	-8.68047828	-6.907815813	1.781626887	-5.126188925	-8.6889427
-38800	-5.237317552	-8.956568666	-6.570992097	-7.507729549	-5.961089109	-8.672196007	-7.150985497	1.491034628	-5.659950869	-8.642020124
-38600	-5.18012435	-8.531669726	-6.982794181	-7.467662771	-5.71950495	-8.639528131	-7.081525374	1.434061033	-5.647464341	-8.515586407
-38400	-5.237207448	-8.784978524	-7.140229396	-7.427	-5.509397363	-8.606860254	-7.117612264	1.497763639	-5.619848625	-8.615375903
-38200	-5.366273984	-8.28	-7.502254023	-7.377	-5.897334633	-8.554937611	-7.096268735	1.27876319	-5.884205185	-8.441731565
-38000	-4.932814407	-8.150355869	-7.967110925	-7.377	-6.285291902	-8.497896613	-7.193411119	1.354168457	-5.839243163	-8.547580076
-37800	-4.549002643	-8.669343365	-7.361706347	-7.276357504	-6.552339181	-8.4440855615	-6.841600776	1.292871794	-5.548728992	-8.13447257
-37600	-4.264306571	-8.863742282	-7.806438374	-7.215649824	-6.634210526	-8.398010657	-6.697059609	1.483883157	-5.213176457	-8.18094276
-37400	-4.55987449	-8.616183891	-7.625185137	-7.154940978	-6.716081871	-8.355381883	-6.871274708	1.282272387	-5.589002321	-8.153547096
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-36800	-5.754663742	-5.409163606	-6.916000374	-7.206717496	-6.311160441	-8.460550359	-6.645651537	1.118840665	-5.262810872	-7.764492202
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9800	-8.867475253	-8.072861273	-8.681375399	-3.955	-8.669677419	-8.603201251	-7.808265099	1.90661299	-5.901652109	-9.714878909
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10200	-8.804527757	-7.80345515	-8.63411863	-3.513139535	-8.866225806	-8.686621481	-7.665930265	2.0722205434	-5.593724831	-9.7381357
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10600	-8.006470138	-7.922495479	-8.661952012	-3.47270217	-8.9050625	-8.694753623	-7.610572654	2.065553374	-5.54501928	-9.676126028
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11000	-8.965336079	-6.544910947	-8.173973137	-4.304572025	-8.9113125	-8.621323671	-7.586571393	1.839714621	-5.746856773	-9.426286014
11200	-8.438750224	-6.123531194	-8.217118106	-4.939227557	-8.9144375	-8.584608696	-7.53627888	1.613495879	-5.9222783	-9.149774759
11400	-7.791738533	-5.116583173	-8.463050587	-5.342824472	-8.9175265	-8.54789372	-7.363275543	1.693638798	-5.669636744	-9.056914341
11600	-8.708961609	-5.605241847	-8.482224874	-5.726329897	-8.902776957	-8.590453686	-7.669354547	1.558668683	-6.110666774	-9.228004139
11800	-8.796061435	-5.812465103	-8.051012166	-5.877647059	-8.824490399	-8.654725898	-7.669400343	1.440741518	-6.228658826	-9.110141861
12000	-8.114059938	-6.386668722	-7.518591466	-5.792085561	-8.74620384	-8.71899811	-7.546101273	1.22964401	-6.316457263	-8.775745283
12200	-8.62428828	-5.837012915	-7.980622422	-5.706524064	-8.667917282	-8.783270321	-7.599393214	1.444159994	-6.15577922	-9.04409208
12400	-8.432538142	-4.666711949	-8.384674129	-5.594313725	-8.589630724	-8.847542533	-7.9192502	1.346588386	-6.372661814	-9.065838587
12600	-8.916552172	-6.974177666	-8.735962072	-5.470130719	-8.511344165	-8.886369706	-7.915301083	1.402391289	-6.512909794	-9.317692373
12800	-8.0360415	-7.536520993	-8.65405683	-5.345947712	-8.43057607	-8.890992647	-7.816102881	1.301260431	-6.51484245	-9.117363313
13000	-8.286596998	-7.74338024	-8.421721604	-5.256551724	-8.409276219	-8.898345588	-7.835971693	1.316470347	-6.519501346	-9.15244204
13200	-8.037978368	-7.351989637	-8.0142708	-5.187586207	-8.45211226	-8.905698529	-7.6582743	1.31569538	-6.34257892	-8.973996981
13400	-8.474998758	-8.034186773	-6.90807708	-5.11862069	-8.494948301	-8.913051471	-7.657313844	1.420948202	-6.26365641	-9.078262046
13600	-8.157664722	-8.237685211	-7.066112447	-4.997684391	-8.537784433	-8.918974837	-7.652650992	1.440639868	-6.212011123	-9.09329086
13800	-8.409874272	-8.297721334	-7.65375828	-4.839879931	-8.580620384	-8.900355508	-7.777377918	1.49685359	-6.280524328	-9.274231509
14000	-8.418018637	-8.192066129	-7.275078599	-4.682075472	-8.623456425	-8.881696179	-7.678731907	1.567964931	-6.110766975	-9.246696838
14200	-8.406295556	-8.12376417	-7.245523262	-4.55959322	-8.666292467	-8.86305685	-7.644087587	1.613369053	-6.030718534	-9.257456641
14400	-9.064158143	-7.51619393	-7.302064317	-4.454508475	-8.69694704	-8.844417521	-7.646381571	1.724688154	-5.921700417	-9.371062725
14600	-8.250482222	-7.001981933	-7.358236203	-4.349423729	-8.721869159	-8.825278192	-7.417961906	1.671391273	-5.746570633	-9.089353179
14800	-8.210182867	-6.038698382	-7.83205216	-4.21040708	-8.746791277	-7.007626353	1.86505843	-5.142567923	-8.872684783	
15000	-8.066262717	-5.219647432	-7.948957206	-4.05819469	-8.771713396	-6.812955088	2.050935705	-4.762019383	-8.863890793	
15200	-8.079339557	-6.849171564	-7.613455666	-3.905982301	-8.796635514	-7.04891692	1.894263136	-5.154653784	-8.943180057	
15400	-7.863499059	-6.518642748	-7.756223431	-4.053568966	-8.82157632	-7.002698367	1.840428004	-5.162270363	-8.842126371	
15600	-7.575925213	-7.34659588	-8.50026668	-4.236327586	-8.840791476	-7.169933365	1.7361146	-5.433818764	-8.906047965	
15800	-8.419118995	-7.716310069	-7.889990656	-4.419086207	-8.848383516	-7.457668309	1.75589198	-5.701776328	-9.213560289	
16000	-8.77354698	-7.586568583	-8.786642194	-4.783763441	-8.846879756	-7.573480191	1.653504219	-5.919975972	-9.226984409	
16200	-8.695908211	-7.342076152	-8.19069037	-5.149354839	-8.84923896	-7.571266427	1.489913934	-6.081352493	-9.061180361	
16400	-8.153348416	-7.349850746	-7.722123758	-5.50076661	-8.852968037	-7.515811513	1.257473116	-6.258383897	-8.773284629	
16600	-7.449299685	-6.990467718	-7.815457562	-5.797189097	-8.856012177	-7.381688888	1.121390323	-6.260298565	-8.50307921	
16800	-7.942976926	-6.733638578	-7.898560083	-6.093611584	-8.859056317	-7.505586897	1.091695461	-6.413873236	-8.597264159	
17000	-7.541959598	-6.551215907	-7.962993542	-6.342701863	-8.924303919	-7.438254966	1.013274334	-6.424980632	-8.515292999	
17200	-8.299108177	-5.994804184	-7.736613623	-6.463819876	-8.694438583	-7.437756889	1.166314289	-6.2714426	-8.604071178	
17400	-7.864331432	-5.737833258	-7.615709706	-6.584937888	-8.596473248	-7.279856998	1.123458401	-6.156398579	-8.403315382	
17600	-8.313713014	-6.029920722	-7.583640085	-6.696011396	-8.498507913	-7.424358626	1.05416617	-6.370192456	-8.478524796	
17800	-8.107783287	-6.016800939	-7.451828367	-6.616239316	-8.400542577	-7.318638897	0.999893884	-6.318745013	-8.318532781	
18000	-7.995996967	-6.078278227	-7.624956749	-6.536467236	-8.302577242	-7.307655284	0.957922641	-6.349732643	-8.265577925	
18200	-7.68184014	-5.871018722	-7.899288321	-6.456695157	-8.20599393	-7.229267254	1.006137878	-6.216829376	-8.229105132	
18400	-6.946632657	-6.021568157	-7.628238524	-6.297367742	-8.133156297	-7.005392675	0.884936504	-6.120456171	-7.89032918	
18600	-6.983877938	-5.706251117	-7.821974766	-6.070270968	-8.060318665	-6.927813491	1.0394351	-5.888378391	-7.967248591	
18800	-6.975918154	-5.118095301	-8.187190392	-5.843174194	-7.987481433	-6.822371815	1.332964003	-5.489407812	-8.155335817	
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19200	-7.377854381	-4.802517123	-8.642685725	-5.505525329	-7.841805766	-6.834077647	1.618221396	-5.215856251	-8.452299042	
19400	-7.525391441	-4.781766162	-8.768144995	-5.453683492	-7.768986134	-6.859590845	1.673825508	-5.185765337	-8.533416353	
19600	-7.645325297	-4.893818466	-8.892224056	-5.401841746	-7.726163366	-6.911879986	1.693781972	-5.218098051	-8.605661958	
19800	-7.451074645	-4.882002286	-8.989968681	-5.35	-7.717912541	-6.878191631	1.718507348	-5.159684282	-8.596698979	
20000	-7.274856155	-4.548581363	-8.91241693	-5.246551724	-7.709661716	-6.738413578	1.8012774	-4.937136178	-8.539690977	
20200	-7.740623291	-3.769705045	-8.87	-5.143103448	-7.701410891	-6.644968535	2.108911668	-4.536056867	-8.753880203	
20400	-7.676487162	-3.754722331	-8.87	-5.039655172	-7.693160066	-6.606804946	2.123486108	-4.483318839	-8.730291054	
20600	-7.845165144	-3.428696005	-8.701421523	-5.018431655	-7.684992401	-6.535724714	2.21818099	-4.317543724	-8.753905703	
20800	-7.58463737	-3.382381567	-8.524891888	-5.073170914	-7.682203083	-6.449444364	2.145752541	-4.303691823	-8.595196905	
21000	-7.632830355	-3.908932031	-8.555562603	-5.127784173	-7.687642792	-6.582660186	1.967398226	-4.61524259	-8.550039042	
21200	-7.287496945	-3.40173164	-8.636776316	-5.167715517	-7.693082502	-6.437360584	2.119200357	-4.318160227	-8.556560941	
21400	-7.826713879	-2.513911509	-8.762947909	-4.894727011	-7.69852212	-6.339364504	2.581392185	-3.731868863	-8.92075669	
21600	-7.869553449	-3.085601271	-8.738262653	-4.621738506	-7.703961922	-6.403823356	2.422537721	-3.981285839	-8.826361282	
21800	-8.162872526	-2.798517941	-8.729331839	-4.34875	-7.709401632	-6.349774787	2.617905924	-3.731868863	-8.967680712	
22000	-8.140113113	-2.491699346	-8.870298936	-4.247739403	-7.727703436	-6.295636847	2.772528785	-3.523054062	-9.068219632	
22200	-7.855380529	-2.520976169	-8.955171801	-4.279136578	-7.747594937	-6.271652003	2.735213384	-3.536438619	-9.006865387	
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22600	-9.055132914	-2.41885759	-8.899749589	-4.313975904	-7.787377939	-6.495018787	2.974018532	-3.521000255	-9.469037319	
22800	-8.03450288	-2.508386485	-8.779062217	-4.271807229	-7.782629439	-6.28020565	2.734686946	-3.545518704	-9.014892596	
23000	-8.410018501	-2.70538363	-8.543938325	-4.229638554	-7.796500453	-6.337026839	2.689342003	-3.647684836	-9.026368843	
23200	-8.944218923	-2.011298974	-8.438403384	-4.190524781	-7.731223935	-6.263134	3.018654973	-3.244479027	-9.281788972	
23400	-8.894907242	-2.361264916	-8.5044044							

-8000	23.56890538	24.12577169	24.00075225	23.82714598	23.79339875	23.4899029	23.80097949
-9000	23.40864908	24.00350245	23.89074432	23.74068662	23.74171794	23.41587673	23.70019619
-10000	23.24478315	23.8691438	23.76698539	23.64311187	23.67915093	23.3397879	23.59049384
-11000	23.08223503	23.72584701	23.63348618	23.5363125	23.60707281	23.26306883	23.47467039
-12000	22.92576025	23.57682063	23.49374172	23.42217927	23.52748895	23.18738108	23.35556198
-13000	22.77954142	23.42596079	23.35153354	23.30283211	23.44234739	23.11415704	23.23606205
-14000	22.64850597	23.27653334	23.21115883	23.18090665	23.35376808	23.04488642	23.11929322
-15000	22.53614895	23.13174686	23.07622722	23.05938226	23.26392827	22.98100161	23.00807253
-16000	22.44573621	22.99486719	22.95052024	22.94077995	23.17500518	22.9237631	22.90511198
-17000	22.38024713	22.86881643	22.83764751	22.82836559	23.08894689	22.87431683	22.81305673
-18000	22.34122871	22.75577182	22.74064572	22.72506127	23.00793063	22.83346492	22.73401718
-19000	22.32948307	22.65819707	22.66197859	22.63350258	22.93373257	22.80200953	22.66981724
-20000	22.3454686	22.57758188	22.60388065	22.55649702	22.8677851	22.78017983	22.62189885
-21000	22.38803936	22.51512946	22.56732593	22.49645102	22.81180711	22.76843419	22.59119785
-22000	22.45553379	22.47169924	22.55317387	22.45491157	22.7668299	22.7668872	22.5781726
-23000	22.54588923	22.44757771	22.56119528	22.43365483	22.73399941	22.77559616	22.58298544
-24000	22.65589713	22.44253568	22.59035884	22.43359753	22.71423236	22.79456107	22.6051971
-25000	22.78206244	22.45622937	22.63917486	22.45473968	22.70775794	22.82366734	22.64393861
-26000	22.92089011	22.48768477	22.70569529	22.49731046	22.71491991	22.8624566	22.69815952
-27000	23.06825485	22.53569865	22.78722721	22.56039314	22.73566099	22.91064236	22.76631287
-28000	23.22008867	22.59889592	22.88113503	22.64238343	22.76940822	22.96753709	22.84657473
-29000	23.37266733	22.67561499	22.98432476	22.74173434	22.81535945	23.03233864	22.93700659
-30000	23.52198013	22.76402241	23.09375974	22.85586758	22.87254066	23.10407298	23.03573392
-31000	23.66470392	22.86222741	23.20646058	22.98168915	22.93957674	23.18142231	23.13934669
-32000	23.79757283	22.96822464	23.31956249	23.11633428	23.01497801	23.26289694	23.24659487
-33000	23.91766479	23.07995145	23.43002879	23.25613604	23.09731208	23.34717906	23.35471204
-34000	24.02268795	23.19540249	23.53551036	23.3971983	23.18480277	23.43254981	23.46135861
-35000	24.11086615	23.31234322	23.63342888	23.5362552	23.27596038	23.51729029	23.56435735
-36000	24.18048053	23.42871099	23.7218363	23.66963983	23.36912335	23.59996813	23.66162652
-37000	24.23078622	23.54238585	23.79907104	23.79397171	23.4625728	23.67874986	23.75125625
-38000	24.26115298	23.65124787	23.86358611	23.90655796	23.55481904	23.75214578	23.83158496
-39000	24.27140893	23.75306251	23.91446478	24.00493485	23.6440859	23.8187235	23.90111341
-40000	24.26172594	23.8459963	23.9510768	24.08681055	23.7286545	23.87722251	23.9585811

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## Average interglacial northern summer insolation

Relative time	MIS 5	MIS 9	MIS 15a	MIS 15c	MIS 19	AVG
25000	491.602809	489.796104	483.798758	508.304022	486.233755	491.9470896
24000	495.623585	490.916082	494.006165	508.276936	489.471832	495.65892
23000	499.526371	492.531639	504.586524	507.496932	492.821907	499.3926746
22000	502.918609	494.330828	514.812597	506.012909	495.944423	502.8038732
21000	505.590946	495.844409	523.634193	504.180244	498.377847	505.525464
20000	507.164733	496.703532	529.505482	501.964225	499.707226	507.0090396
19000	507.253104	496.386829	531.194766	499.50849	499.604836	506.789605
18000	505.662028	494.580614	527.50279	496.914034	498.01548	504.5349892
17000	502.314635	491.106087	518.652154	494.092425	495.064713	500.2460028
16000	497.291638	486.184038	505.696605	491.052559	491.10967	494.266902
15000	491.064647	480.185882	490.854068	487.81175	486.837452	487.3507598
14000	484.192789	473.956882	476.310087	484.376751	482.824698	480.3322414
13000	477.402784	468.225349	463.980212	480.807208	479.650735	474.0132576
12000	471.35746	463.848157	455.035153	477.396127	477.88539	469.1044574
11000	466.746233	461.279231	449.994344	474.302651	477.670958	465.9986834
10000	463.914049	460.987398	448.782728	471.85446	479.104169	464.9285608
9000	463.146133	462.927451	451.034131	470.398679	482.175706	465.93642
8000	464.524535	467.091219	456.269123	470.129312	486.550373	468.9129124
7000	467.90302	473.172366	463.770029	471.251018	492.004742	473.620235
6000	473.11613	480.855802	473.11972	473.889415	498.189014	479.8340162
5000	479.899167	489.755964	483.695141	477.961586	504.630135	487.1883986
4000	487.854085	499.433279	495.158817	483.408692	510.880908	495.3471562
3000	496.790215	509.46521	507.027643	490.066435	516.461843	503.9622692
2000	506.27537	519.246486	518.920264	497.678854	520.707959	512.5657866
1000	516.023848	528.213901	530.09157	505.915603	523.172879	520.6835602
0	525.655656	535.564021	539.841304	514.494337	523.368829	527.7848294
-1000	534.660962	540.486422	546.95407	522.774866	521.134166	533.2020972
-2000	542.283172	542.242219	550.471424	530.20895	516.502238	536.3416006
-3000	547.740375	540.340607	549.494052	535.918825	510.166196	536.732011
-4000	549.906201	534.627564	543.760585	538.990027	502.615023	533.97988
-5000	547.847532	525.798926	533.863947	538.490465	494.963089	528.1927918
-6000	541.112534	514.633809	521.104477	534.060488	487.918236	519.7659088
-7000	529.825675	502.548709	507.084286	525.532539	482.156653	509.4295724
-8000	515.042685	490.831344	493.455592	513.876787	478.049564	498.2511944
-9000	498.442919	480.46188	481.515347	500.361592	475.893773	487.3351022
-10000	481.893017	472.214373	472.027534	486.653796	475.459847	477.6497134
-11000	467.045717	466.506898	465.287259	474.201578	476.711683	469.950627
-12000	455.102403	463.328848	461.410159	464.199784	479.344106	464.67706
-13000	446.665864	462.602094	460.009597	457.238319	482.947248	461.8926244
-14000	441.929266	464.113969	460.838694	453.514138	487.213431	461.5218996
-15000	440.689835	467.463064	463.46635	452.955162	491.741107	463.2631036
-16000	442.588198	472.401995	467.519669	455.166588	495.94312	466.723914
-17000	447.201436	478.644618	472.58269	459.757137	499.449521	471.5270804
-18000	454.009844	485.768373	478.42874	466.340245	501.748207	477.2590818
-19000	462.681198	493.491403	484.546811	474.435347	502.367318	483.5044154
-20000	472.733614	501.263951	490.694143	483.798758	501.222855	489.9426642
-21000	483.847857	508.378108	496.296467	494.006165	498.430858	496.191891
-22000	495.441091	514.024106	500.929563	504.586524	494.188554	501.8339676
-23000	506.888085	517.260476	504.025285	514.812597	489.414667	506.480222
-24000	517.178021	517.244859	505.287818	523.634193	484.604456	509.5898694
-25000	525.21086	513.746057	504.457061	529.505482	480.533278	510.6905476
-26000	529.794335	506.977719	501.759292	531.194766	477.684539	509.4821302
-27000	530.12076	497.884968	497.663903	527.50279	476.43429	505.9213422
-28000	526.119952	487.82631	492.766582	518.652154	476.671341	500.4072678
-29000	518.41874	478.252015	487.831294	505.696605	478.547855	493.7493018
-30000	508.400225	470.174606	483.574663	490.854068	481.667635	486.9342394
-31000	497.770285	464.52149	480.334034	476.310087	485.697679	480.926715
-32000	487.92063	461.596717	478.473066	463.980212	490.350665	476.464258
-33000	479.931175	461.332144	478.095675	455.035153	495.110286	473.9008866
-34000	474.566509	463.654918	478.973979	449.994344	499.505078	473.3389656
-35000	471.768087	468.120494	481.06085	448.782728	503.206691	474.58777
-36000	471.611781	474.266228	484.06564	451.034131	505.832866	477.3621292
-37000	473.682574	481.781787	487.653262	456.269123	507.022141	481.2817774
-38000	477.577774	490.156586	491.594966	463.770029	507.03277	486.026425
-39000	482.85649	499.026785	495.70764	473.11972	505.759615	491.29405
-40000	489.151779	508.012559	499.612445	483.695141	503.715662	496.8375172