

Postup Bayesovské analýzy:

1. Určete všechny hypotézy
2. Pro každou hypotézu určete apriorní pravděpodobnost
3. Získejte data
4. Zjistěte věrohodnost dat pro každou hypotézu
5. Použijte Bayesův teorém k vypočítání aposteriorní pravděpodobnosti

BEAST

(Bayesian Evolutionary Analysis by Sampling Trees)

BEAUti ... příprava vstupního souboru pro BEAST

BEAST ... vlastní analýza

Tracer ... prozkoumání výsledků

LogCombiner ... kombinace log a tree souborů

TreeAnnotator ... hledání „nejlepšího“ stromu

DensiTree ... vizualizace stromů z několika markerů

BEAUTi 2: Standard C:\Users\admin\Desktop\BEAST\Homo\Datalog1.xml

File Mode View Help

Partitions Tip Dates Site Model Clock Model Priors MCMC

Link Site Models

Unlink Site Models

Link Clock Models

Unlink Clock Models

Link Trees

Unlink Trees

BEAUTi 2: Standard C:\Users\admin\Desktop\BEAST\Homo\Datalog1.xml

File Mode View Help

Partitions Tip Dates Site Model Clock Model Priors MCMC

Link Site Models Unlink Site Models Link Clock Models Unlink Clock Models Link Trees Unlink Trees

	Partitions	Sites	Data Type	Site Model	Clock Model	Tree	
Set1	AIMt	568	1122	nucleotide	Set1	Set1	...
Set2	AIMt	568	5783	nucleotide	Set2	Set1	...
Set3	AIMt	568	1628	nucleotide	Set3	Set1	...
Set4	AIMt	568	3872	nucleotide	Set4	Set1	...
Set5	AIMt	568	1900	nucleotide	Set5	Set1	...

Report sites for this partition

Partitions **Tip Dates** Site Model Clock Model Priors MCMC

Use tip dates

Dates specified: numerically as year Since some time in the past

as dates with format dd/M/yyyy ?

Name	Date (raw value)
NC_012920	0
I5469	-3586
Val3_99	-3553

BEAUI 2: Standard C:\Users\admin\Desktop\BEAST\Homo\Datalog1.xml

Partitions Tip Dates Site Model Clock Model Priors MCMC

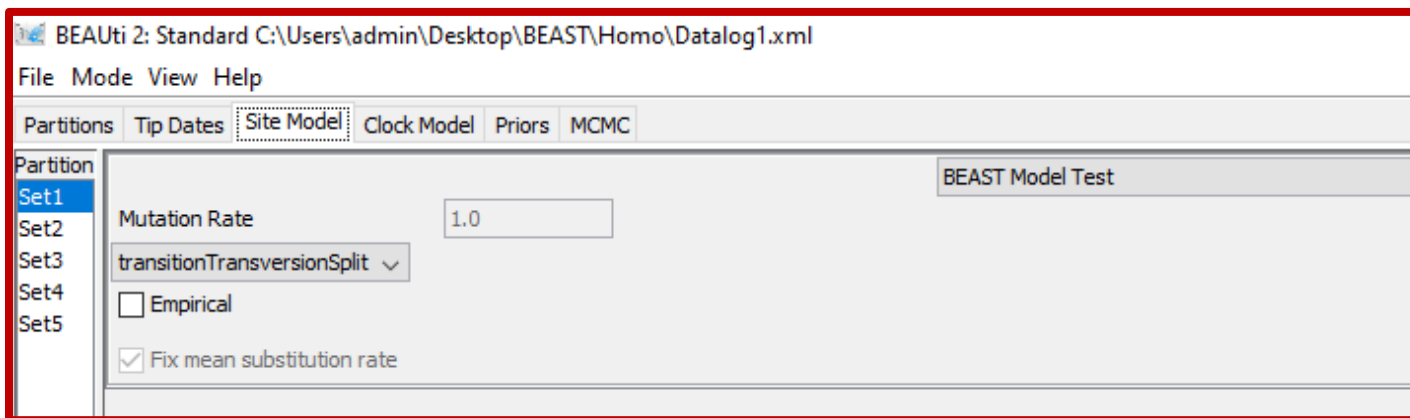
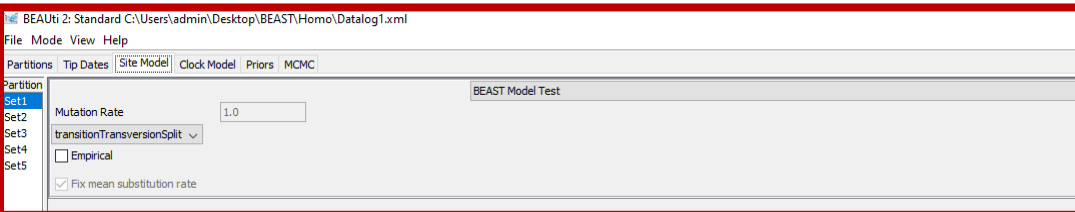
Use tip dates

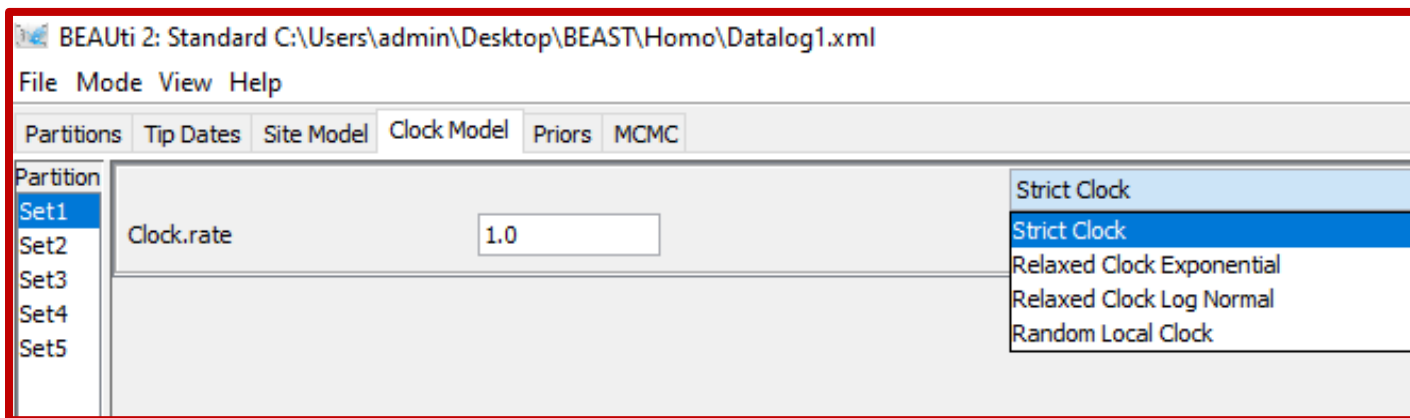
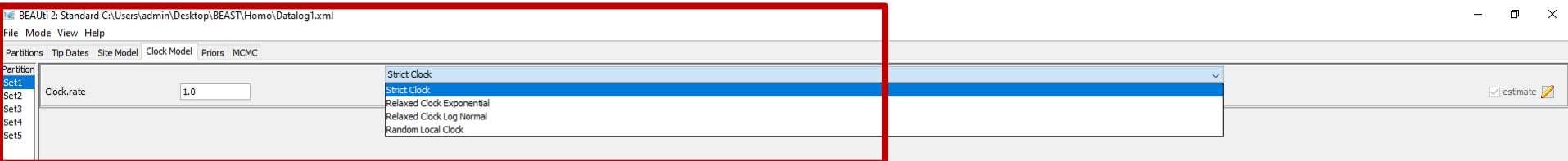
Dates specified: numerically as year Since some time in the past

as dates with format dd/M/yyyy ?

Auto-configure Clear

Name	Date (raw value)	Height
NC_012920	0	0.0
I5469	-3586	3586.0
Val3_99	-3553	3553.0
I5470	-3548	3548.0
I7630	-3798	3798.0
poz222	-4980	4980.0
poz212	-4983	4983.0
poz220	-4680	4680.0
poz225	-4753	4753.0
I5364	-3213	3213.0
823	-3913	3913.0
I2601	-3866	3866.0
I7203	-3963	3963.0
I7569	-3551	3551.0
I2610	-3853	3853.0
806	-3913	3913.0
POST_12	-4122	4122.0
POST_140	-4033	4033.0
I7628	-3106	3106.0
WEHR_1375	-3880	3880.0
UNTA85_110	-4229	4229.0
Val145	-3553	3553.0
ZV	-3913	3913.0
I0122	-6613	6613.0
I7572	-3419	3419.0
I2600	-4048	4048.0
Val107	-3553	3553.0
KC346242	0	0.0
KC346230	0	0.0
KC345800	0	0.0
KC345810	0	0.0
844	-3913	3913.0
825	-3913	3913.0
POST_111	-4045	4045.0
I2596	-4167	4167.0
I2405	-5191	5191.0
I2565	-4315	4315.0
I1770	-4013	4013.0
POST_137	-3984	3984.0
WEHR_1586	-3878	3878.0
POST_47	-4058	4058.0
I2435	-5013	5013.0
I5515	-3918	3918.0
UNTA85_113	-4319	4319.0





BEAUi 2: Standard

Partitions | Tip Dates | Site Model | Clock Model | Priors | MCMC

▶ Tree.t:noncoding	Calibrated Yule Model		
▶ birthRateY.t:noncoding	Uniform	initial = [1.0] [-∞,∞]	Calibrated Yule speciation process birth rate for t:noncoding
▶ gammaShape.s:1stpos	Exponential	initial = [1.0] [-∞,∞]	Prior on gamma shape for partition s:1stpos
▶ gammaShape.s:2ndpos	Exponential	initial = [1.0] [-∞,∞]	Prior on gamma shape for partition s:2ndpos
▶ gammaShape.s:3rdpos	Exponential	initial = [1.0] [-∞,∞]	Prior on gamma shape for partition s:3rdpos
▶ gammaShape.s:noncoding	Exponential	initial = [1.0] [-∞,∞]	Prior on gamma shape for partition s:noncoding
▶ kappa.s:1stpos	Log Normal	initial = [2.0] [0.0,∞]	
▶ kappa.s:2ndpos	Log Normal	initial = [2.0] [0.0,∞]	
▶ kappa.s:3rdpos	Log Normal	initial = [2.0] [0.0,∞]	
▶ kappa.s:noncoding	Log Normal	initial = [2.0] [0.0,∞]	HKY transition-transversion parameter of partition s:noncoding

+

▶ Tree.t:Set1	Coalescent Constant Population		
▶ BMT_ProportionInvariable.s:Set1	Yule Model		
▶ BMT_RatesPrior.s:Set1: Prior Type	Calibrated Yule Model		
▶ BMT_frequencies.s:Set1	Birth Death Model		
▶ BMT_gammaShape.s:Set1	Coalescent Constant Population		
▶ clockRate.c:Set1	Uniform	initial = [1.0] [-∞, ∞]	substitution rate of partition c:Set1
▶ clockRate.c:Set2	Uniform	initial = [1.0] [-∞, ∞]	substitution rate of partition c:Set2
▶ clockRate.c:Set3	Uniform	initial = [1.0] [-∞, ∞]	substitution rate of partition c:Set3
▶ clockRate.c:Set4	Uniform	initial = [1.0] [-∞, ∞]	substitution rate of partition c:Set4
▶ clockRate.c:Set5	Uniform	initial = [1.0] [-∞, ∞]	substitution rate of partition c:Set5
▶ popSize.t:Set1	1/X	initial = [0.3] [-∞, ∞]	Coalescent population size parameter of partition t:Set5

+ Add Prior

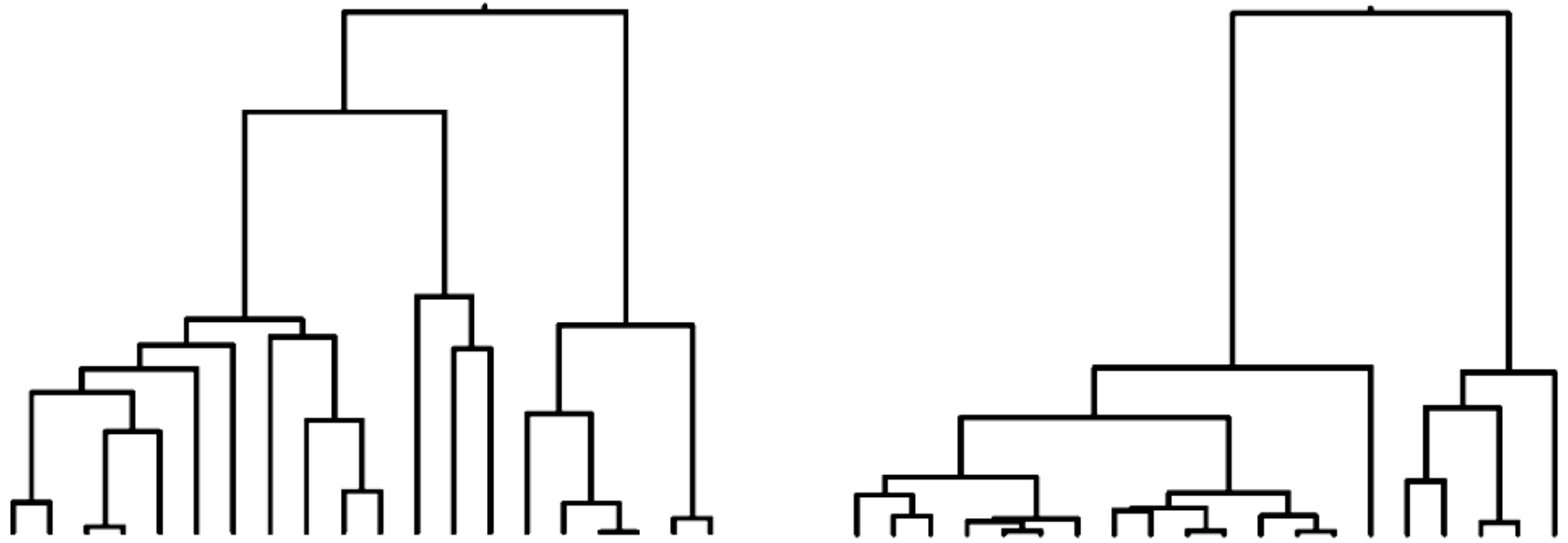



Figure 7.1 Left, a simulated Yule tree; right, a simulated coalescent (with constant population) tree with 20 taxa. Note, coalescent trees have much shorter branches near the tips.

BEAUti 2: Standard

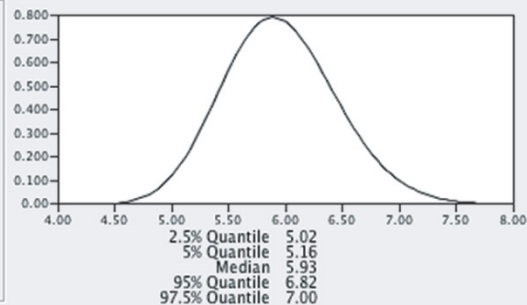
Partitions Tip Dates Site Model Clock Model Priors MCMC

- ▶ Tree.t:noncoding Calibrated Yule Model
- ▶ birthRateY.t:noncoding Uniform initial = [1.0] $[-\infty, \infty]$ Calibrated Yule speciation process birth rate for t:noncoding
- ▶ clockRate.c:noncoding Uniform initial = [1.0] $[-\infty, \infty]$ substitution rate of partition c:noncoding
- ▶ gammaShape.s:1stpos Exponential initial = [1.0] $[-\infty, \infty]$ Prior on gamma shape for partition s:1stpos
- ▶ gammaShape.s:2ndpos Exponential initial = [1.0] $[-\infty, \infty]$ Prior on gamma shape for partition s:2ndpos
- ▶ gammaShape.s:3rdpos Exponential initial = [1.0] $[-\infty, \infty]$ Prior on gamma shape for partition s:3rdpos
- ▶ gammaShape.s:noncoding Exponential initial = [1.0] $[-\infty, \infty]$ Prior on gamma shape for partition s:noncoding
- ▶ kappa.s:1stpos Log Normal initial = [2.0] [0.0, ∞]
- ▶ kappa.s:2ndpos Log Normal initial = [2.0] [0.0, ∞]
- ▶ kappa.s:3rdpos Log Normal initial = [2.0] [0.0, ∞]
- ▶ kappa.s:noncoding Log Normal initial = [2.0] [0.0, ∞] HKY transition-transversion parameter of partition s:noncoding

▼ human-chimp.prior Log Normal monophyletic

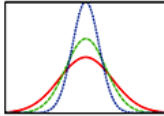
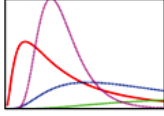
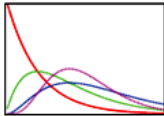
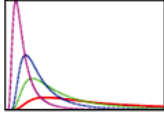
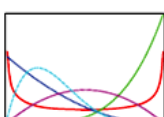

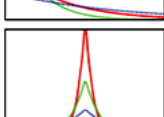
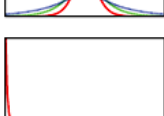
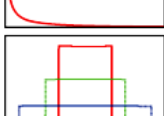
M 1.78 estimate S 0.085 estimate  Mean In Real Space

Offset 0.0

 Tiponly Use Originate

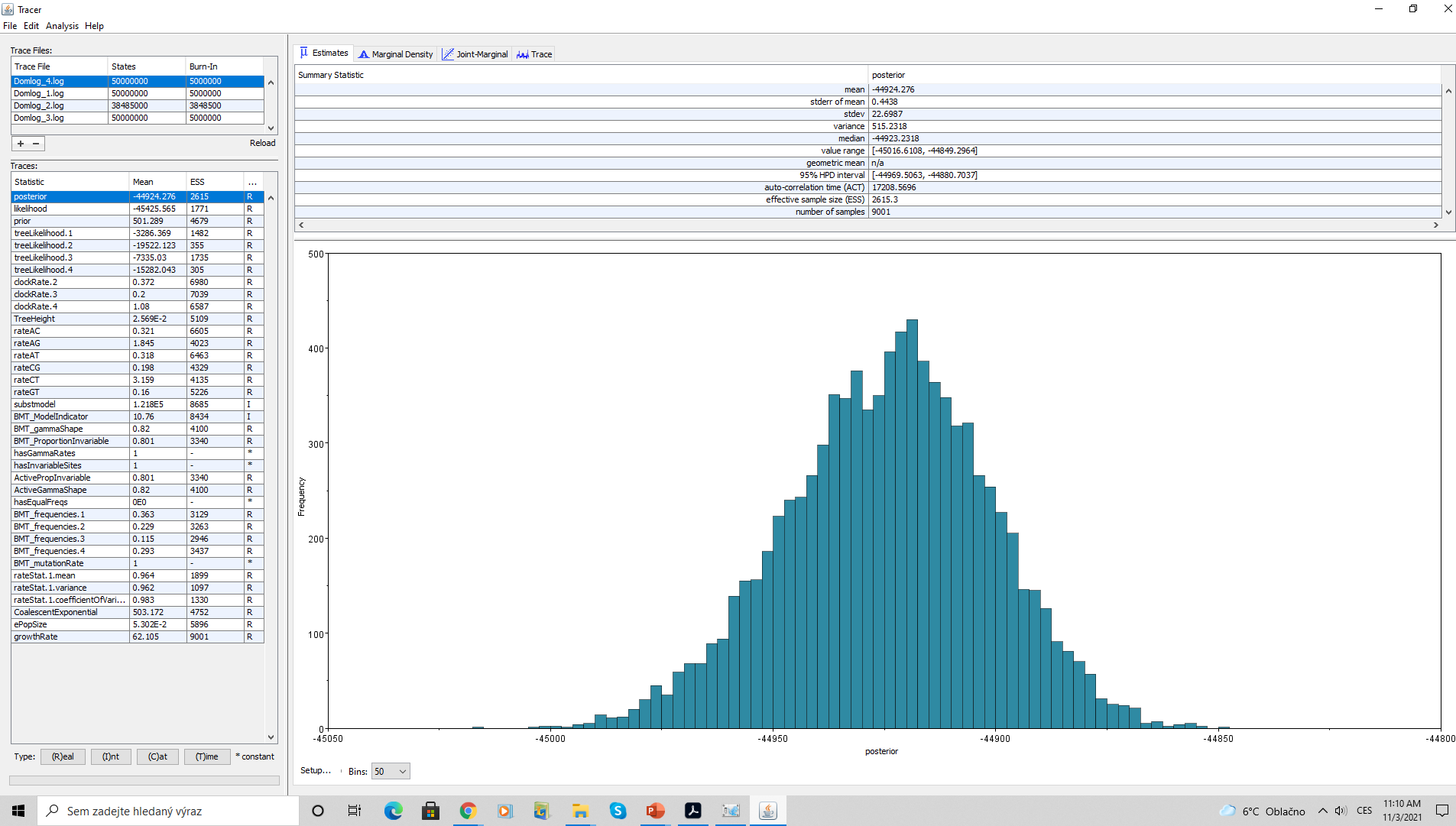
+

Table 7.2 Some common distributions used as priors and some of their properties. Plots indicate some of the shapes

Probability density function		Parameter	Effect of increasing parameter on distribution	Range*
Normal $N(x \mu, \sigma) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-(x-\mu)^2/\sigma^2}$		Mean μ Standard deviation σ	Shift to right Make distribution wider and flatter	$(-\infty, \infty)$
Log-normal $LN(x M, S) = \frac{1}{x\sqrt{2\pi S^2}} e^{-(\ln(x)-M)^2/S^2}$		Mean M^\dagger Standard deviation S Offset o	Shift to right Make distribution wider and flatter Shift to right	$[0, \infty)$
Gamma $\Gamma(x \alpha, \beta)^\ddagger = \frac{1}{\Gamma(\alpha)\beta^\alpha} x^{\alpha-1} e^{-x/\beta}$		Shape α Scale β Offset o	Concentrate into peak at $(\alpha\beta)$ once $\alpha > 1$ Flattens Shift to right	$[0, \infty)$
Inverse gamma $\Pi\Gamma(x \alpha, \beta) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{-\alpha-1} e^{-\beta/x}$		Shape α Scale β Offset o	Concentrate into peak Flattens Shift to right	$[0, \infty)$
Beta $Beta(x \alpha, \beta) = \frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1.0-x)^{\beta-1}$		Shape α Shape β Offset o	Shift mode left and concentrate Shift mode right and concentrate Shift to right	$[0, 1]$
Exponential $exp(x \lambda) = \frac{1}{\lambda} e^{-x/\lambda}$		Scale λ Offset o	Increase mean and std.dev. linearly with λ Shift to right	$[0, \infty]$
Laplace $L(x \mu, b) = \frac{1}{2b} e^{- x-m /b}$		Mean μ Scale b	Shift to right Increase std.dev. linearly with b	$(-\infty, \infty)$
1/X <i>OneOnX</i> (x) $= \frac{1}{x}$		Offset o	Shift to right	$[0, \infty)$
uniform $U(x l, u) = \begin{cases} \frac{1}{u-l} & \text{if } l \leq x \leq u \\ 0 & \text{otherwise} \end{cases}$		Lower l Upper u	Shift to left Shift to right	$(-\infty, \infty)$

* If offset is set to non-zero, the offset should be added to the range. $\dagger M$ is the mean of $\log x$, but the log-normal distribution can also be specified by its true mean, μ . If so, μ is the mean of the distribution. \ddagger NB a number of parameterisations are in use, this shows the one we use in BEAST.

Tracer output:



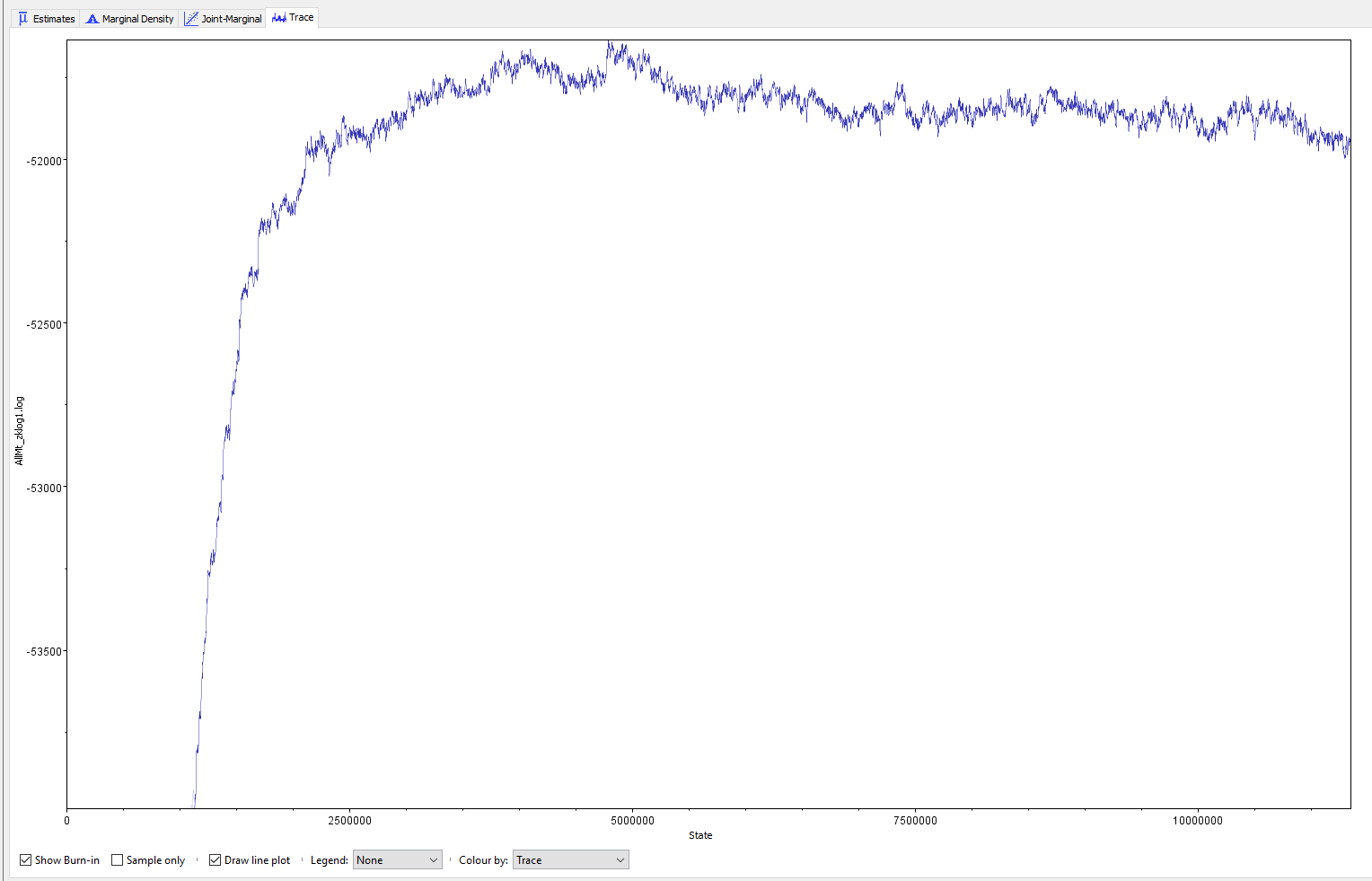
Trace Files:

Trace File	States	Burn-In
AlIMt_zklog1.log	11348000	1134800

Traces:

Statistic	Mean	ESS	...
posterior	-51905.251	10	R
likelihood	-44300.694	6	R
prior	-7604.557	3	R
treeLikelihood.1	-8799.87	7	R
treeLikelihood.2	-15075.303	5	R
treeLikelihood.3	-5243.604	11	R
treeLikelihood.4	-8376.52	7	R
treeLikelihood.5	-6805.398	6	R
clockRate.1	2.529E-6	4	R
clockRate.2	8.378E-8	4	R
clockRate.3	1.201E-7	5	R
clockRate.4	5.19E-8	4	R
clockRate.5	1.513E-7	5	R
TreeHeight	91705.753	3	R
rateAC	0.173	1076	R
rateAG	0.762	972	R
rateAT	0.161	1457	R
rateCG	0.161	1496	R
rateCT	4.587	863	R
rateGT	0.156	1556	R
substmodel	1.218E5	2268	I
BMT_ModelIndicator	8.918	2234	I
BMT_gammaShape	0.267	512	R
BMT_ProportionInvariable	0.505	2462	R
hasGammaRates	1	-	*
hasInvariableSites	1	-	*
ActivePropInvariable	0.505	2462	R
ActiveGammaShape	0.267	512	R
hasEqualFreqs	0E0	-	*
BMT_frequencies.1	0.315	720	R
BMT_frequencies.2	0.314	292	R
BMT_frequencies.3	0.153	808	R
BMT_frequencies.4	0.218	169	R
BMT_mutationRate	1	-	*
popSize	2.659E5	3	R
CoalescentConstant	-7588.573	3	R

Type: (R)real (I)int (C)at (T)ime * constant



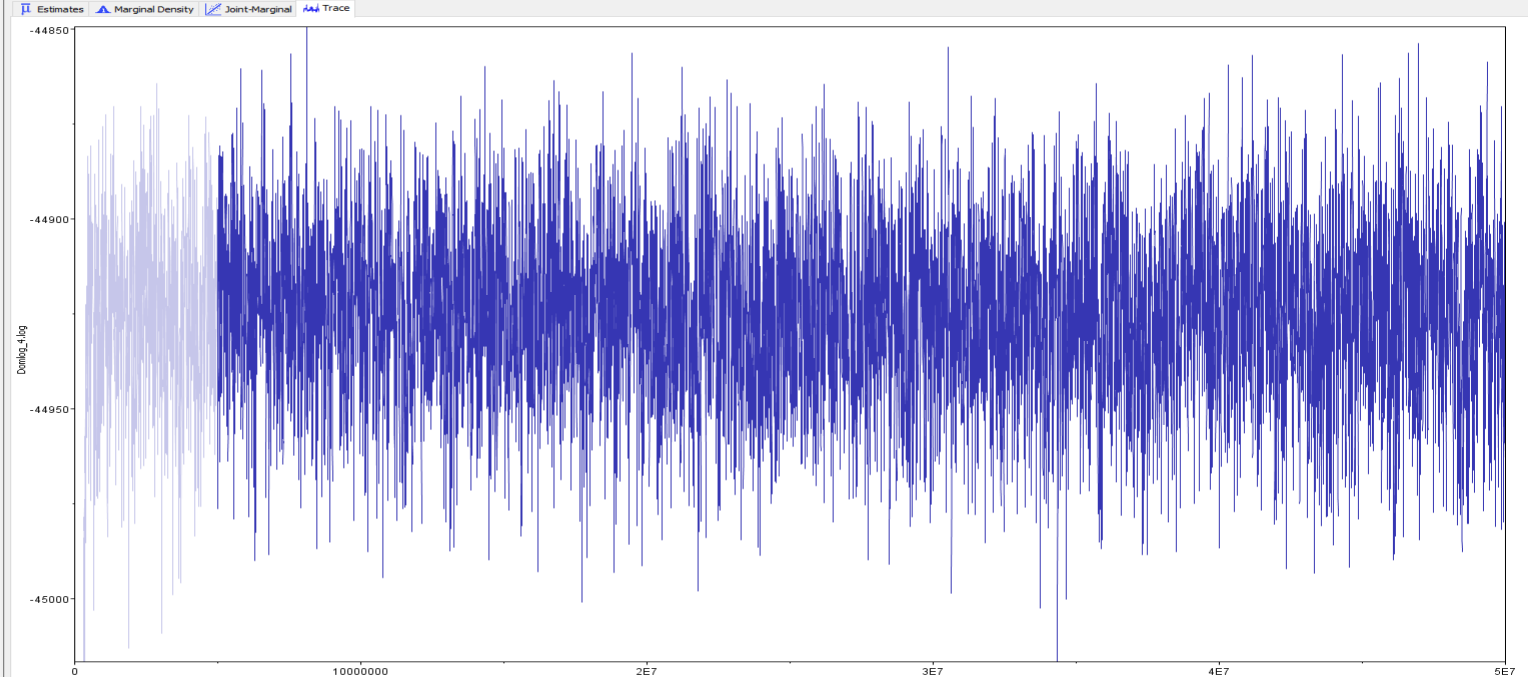
Trace Files:

Trace File	States	Burn-In
Domlog_1.log	50000000	5000000
Domlog_2.log	38485000	3848500
Domlog_3.log	50000000	5000000
Domlog_4.log	50000000	5000000

Reload

Traces:

Statistic	Mean	ESS	...
posterior	-44924.276	2615	R
likelihood	-45425.565	1771	R
prior	501.289	4679	R
treeLikelihood.1	-3286.369	1482	R
treeLikelihood.2	-19522.123	355	R
treeLikelihood.3	-7335.03	1735	R
treeLikelihood.4	-15282.043	305	R
clockRate.2	0.372	6980	R
clockRate.3	0.2	7039	R
clockRate.4	1.08	6587	R
TreeHeight	2.569E-2	5109	R
rateAC	0.321	6605	R
rateAG	1.845	4023	R
rateAT	0.318	6463	R
rateCG	0.198	4329	R
rateCT	3.159	4135	R
rateGT	0.16	5226	R
subsmoel	1.218E5	8685	I
BMT_ModelIndicator	10.76	8434	I
BMT_gammaShape	0.82	4100	R
BMT_ProportionInvariable	0.801	3340	R
hasGammaRates	1	-	*
hasInvariableSites	1	-	*
ActivePropInvariable	0.801	3340	R
ActiveGammaShape	0.82	4100	R
hasEqualFreqs	0E0	-	*
BMT_frequencies.1	0.363	3129	R
BMT_frequencies.2	0.229	3263	R
BMT_frequencies.3	0.115	2946	R
BMT_frequencies.4	0.293	3437	R
BMT_mutationRate	1	-	*
rateStat.1.mean	0.964	1899	R
rateStat.1.variance	0.962	1097	R
rateStat.1.coefficientOfVari...	0.983	1330	R
CoalescentExponential	503.172	4752	R
ePopSize	5.302E-2	5896	R
growthRate	62.105	9001	R



Trace Files:

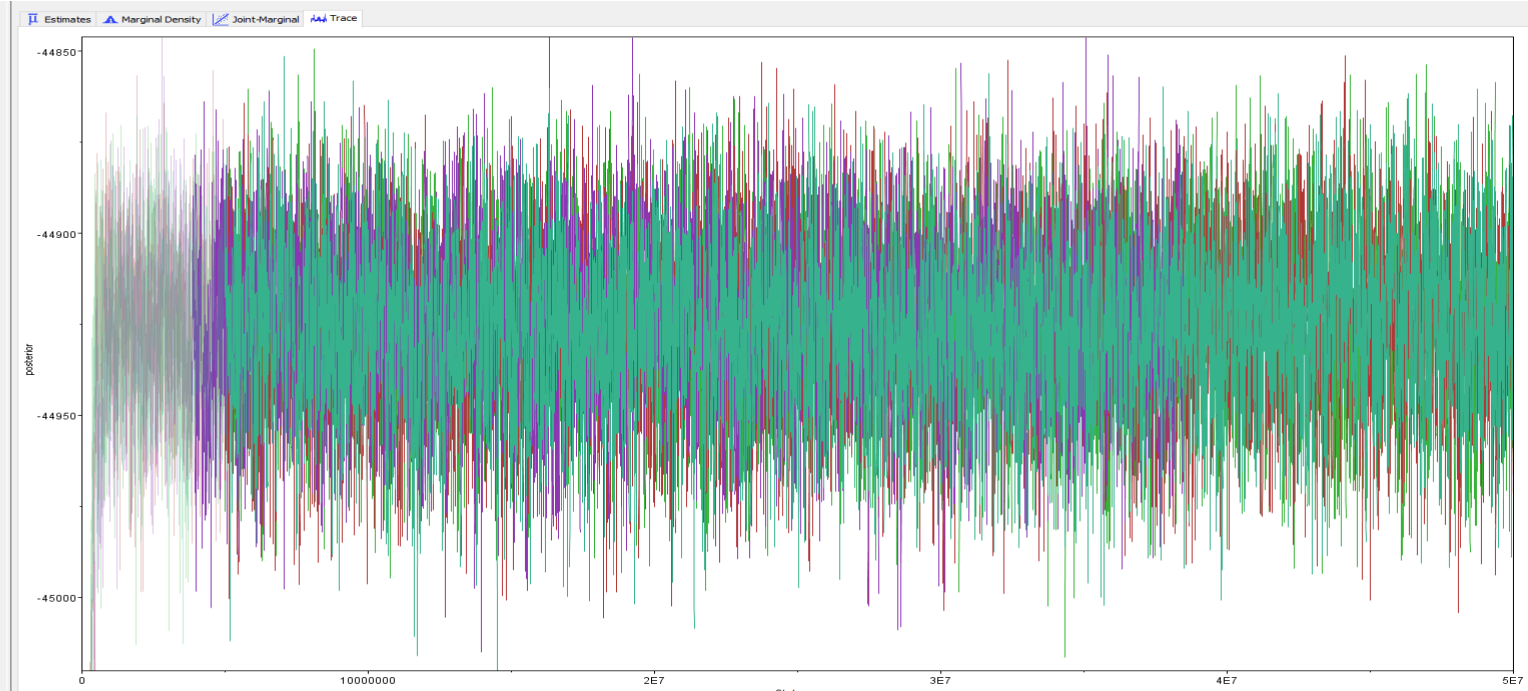
Trace File	States	Burn-In
Domlog_4.log	50000000	5000000
Domlog_1.log	50000000	5000000
Domlog_2.log	38485000	3848500
Domlog_3.log	50000000	5000000

Reload

Traces:

Statistic	Mean	ESS	...
posterior	-44924.276	2615	R
likelihood	-45425.565	1771	R
prior	501.289	4679	R
treeLikelihood.1	-3286.369	1482	R
treeLikelihood.2	-19522.123	355	R
treeLikelihood.3	-7335.03	1735	R
treeLikelihood.4	-15282.043	305	R
clockRate.2	0.372	6980	R
clockRate.3	0.2	7039	R
clockRate.4	1.08	6587	R
TreeHeight	2.569E-2	5109	R
rateAC	0.321	6605	R
rateAG	1.845	4023	R
rateAT	0.318	6463	R
rateCG	0.198	4329	R
rateCT	3.159	4135	R
rateGT	0.16	5226	R
subsmoel	1.218E5	8685	I
BMT_ModelIndicator	10.76	8434	I
BMT_gammaShape	0.82	4100	R
BMT_ProportionInvariable	0.801	3340	R
hasGammaRates	1	-	*
hasInvariableSites	1	-	*
ActivePropInvariable	0.801	3340	R
ActiveGammaShape	0.82	4100	R
hasEqualFreqs	0E0	-	*
BMT_frequencies.1	0.363	3129	R
BMT_frequencies.2	0.229	3263	R
BMT_frequencies.3	0.115	2946	R
BMT_frequencies.4	0.293	3437	R
BMT_mutationRate	1	-	*
rateStat.1.mean	0.964	1899	R
rateStat.1.variance	0.962	1097	R
rateStat.1.coefficientOfVari...	0.983	1330	R
CoalescentExponential	503.172	4752	R
ePopSize	5.302E-2	5896	R
growthRate	62.105	9001	R

Type: (R)real (I)nt (C)at (T)ime * constant



Trace Files:

Trace File	States	Burn-In
Domlog_4.log	50000000	5000000
Domlog_1.log	50000000	5000000
Domlog_2.log	38485000	3848500
Domlog_3.log	50000000	5000000

+ - Reload

Traces:

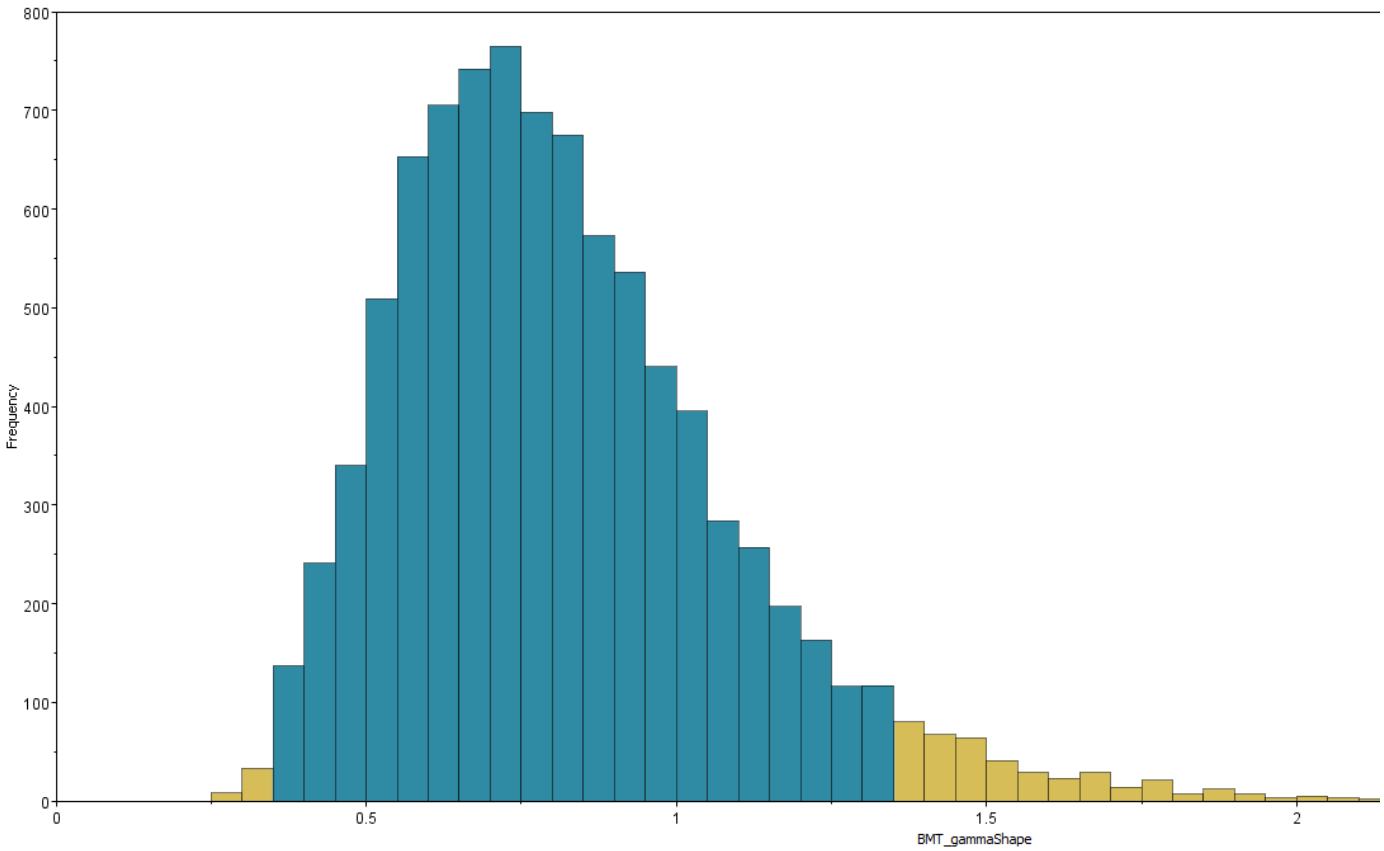
Statistic	Mean	ESS	...
posterior	-44924.276	2615	R
likelihood	-45425.565	1771	R
prior	501.289	4679	R
treeLikelihood.1	-3286.369	1482	R
treeLikelihood.2	-19522.123	355	R
treeLikelihood.3	-7335.03	1735	R
treeLikelihood.4	-15282.043	305	R
clockRate.2	0.372	6980	R
clockRate.3	0.2	7039	R
clockRate.4	1.08	6587	R
TreeHeight	2.569E-2	5109	R
rateAC	0.321	6605	R
rateAG	1.845	4023	R
rateAT	0.318	6463	R
rateCG	0.198	4329	R
rateCT	3.159	4135	R
rateGT	0.16	5226	R
substmodel	1.218E5	8685	I
BMT_ModelIndicator	10.76	8434	I
BMT_gammaShape	0.82	4100	R
BMT_ProportionInvariable	0.801	3340	R
hasGammaRates	1	-	*
hasInvariableSites	1	-	*
ActivePropInvariable	0.801	3340	R
ActiveGammaShape	0.82	4100	R
hasEqualFreqs	OE0	-	*
BMT_frequencies.1	0.363	3129	R
BMT_frequencies.2	0.229	3263	R
BMT_frequencies.3	0.115	2946	R
BMT_frequencies.4	0.293	3437	R
BMT_mutationRate	1	-	*
rateStat.1.mean	0.964	1899	R
rateStat.1.variance	0.962	1097	R
rateStat.1.coefficientOfVari...	0.983	1330	R
CoalescentExponential	503.172	4752	R
ePopSize	5.302E-2	5896	R
growthRate	62.105	9001	R

Type: (R)real (I)nt (C)at (T)ime *constant

Estimates Marginal Density Joint-Marginal Trace

Summary Statistic

Summary Statistic	BMT_gammaShape
mean	0.82
stderr of mean	4.3058E-3
stdev	0.2757
variance	0.076
median	0.7774
value range	[0.2575, 2.7302]
geometric mean	0.7778
95% HPD interval	[0.3492, 1.352]
auto-correlation time (ACT)	10978.0379
effective sample size (ESS)	4099.5
number of samples	9001



Setup... Bins: 50

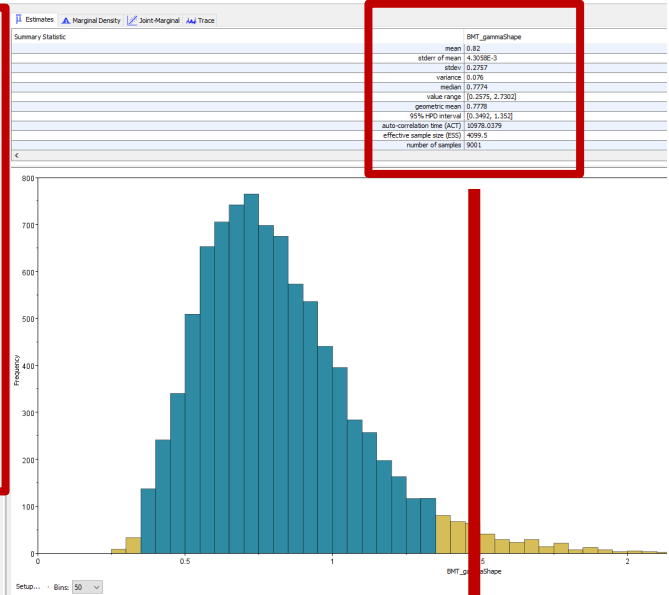
ESS = Effective Sample Size

Traces:

Statistic	Mean	ESS	...
posterior	-44924.276	2615	R
likelihood	-45425.565	1771	R
prior	501.289	4679	R
treeLikelihood.1	-3286.369	1482	R
treeLikelihood.2	-19522.123	355	R
treeLikelihood.3	-7335.03	1735	R
treeLikelihood.4	-15282.043	305	R
clockRate.2	0.372	6980	R
clockRate.3	0.2	7039	R
clockRate.4	1.08	6587	R
TreeHeight	2.569E-2	5109	R
rateAC	0.321	6605	R
rateAG	1.845	4023	R
rateAT	0.318	6463	R
rateCG	0.198	4329	R
rateCT	3.159	4135	R
rateGT	0.16	5226	R
substmodel	1.218E5	8685	I
BMT_ModelIndicator	10.76	8434	I
BMT_gammaShape	0.82	4100	R
BMT_ProportionInvariable	0.801	3340	R
hasGammaRates	1	-	*
hasInvariableSites	1	-	*
ActivePropInvariable	0.801	3340	R
ActiveGammaShape	0.82	4100	R
hasEqualFreqs	0E0	-	*
BMT_frequencies.1	0.363	3129	R
BMT_frequencies.2	0.229	3263	R
BMT_frequencies.3	0.115	2946	R
BMT_frequencies.4	0.293	3437	R
BMT_mutationRate	1	-	*
rateStat.1.mean	0.964	1899	R
rateStat.1.variance	0.962	1097	R
rateStat.1.coefficientOfVari...	0.983	1330	R
CoalescentExponential	503.172	4752	R
ePopSize	5.302E-2	5896	R
growthRate	62.105	9001	R

Trace File	State	Burn-In
Downlog_4.log	5000000	5000000
Downlog_1.log	5000000	5000000
Downlog_2.log	3849000	3849000
Downlog_3.log	5000000	5000000

Statistic	Mean	ESS	...
posterior	-44924.276	2615	R
likelihood	-45425.565	1771	R
prior	501.289	4679	R
treeLikelihood.1	-3286.369	1482	R
treeLikelihood.2	-19522.123	355	R
treeLikelihood.3	-7335.03	1735	R
treeLikelihood.4	-15282.043	305	R
clockRate.2	0.372	6980	R
clockRate.3	0.2	7039	R
clockRate.4	1.08	6587	R
TreeHeight	2.569E-2	5109	R
rateAC	0.321	6605	R
rateAG	1.845	4023	R
rateAT	0.318	6463	R
rateCG	0.198	4329	R
rateCT	3.159	4135	R
rateGT	0.16	5226	R
substmodel	1.218E5	8685	I
BMT_ModelIndicator	10.76	8434	I
BMT_gammaShape	0.82	4100	R
BMT_ProportionInvariable	0.801	3340	R
hasGammaRates	1	-	*
hasInvariableSites	1	-	*
ActivePropInvariable	0.801	3340	R
ActiveGammaShape	0.82	4100	R
hasEqualFreqs	0E0	-	*
BMT_frequencies.1	0.363	3129	R
BMT_frequencies.2	0.229	3263	R
BMT_frequencies.3	0.115	2946	R
BMT_frequencies.4	0.293	3437	R
BMT_mutationRate	1	-	*
rateStat.1.mean	0.964	1899	R
rateStat.1.variance	0.962	1097	R
rateStat.1.coefficientOfVari...	0.983	1330	R
CoalescentExponential	503.172	4752	R
ePopSize	5.302E-2	5896	R
growthRate	62.105	9001	R



	BMT_gammaShape
mean	0.82
stderr of mean	4.3058E-3
stdev	0.2757
variance	0.076
median	0.7774
value range	[0.2575, 2.7302]
geometric mean	0.7778
95% HPD interval	[0.3492, 1.352]
auto-correlation time (ACT)	10978.0379
effective sample size (ESS)	4099.5
number of samples	9001

Trace Files:

Trace File	States	Burn-In
Domlog_1.log	50000000	5000000
Domlog_2.log	38485000	3848500
Domlog_3.log	50000000	5000000
Domlog_4.log	50000000	5000000

+ - Reload

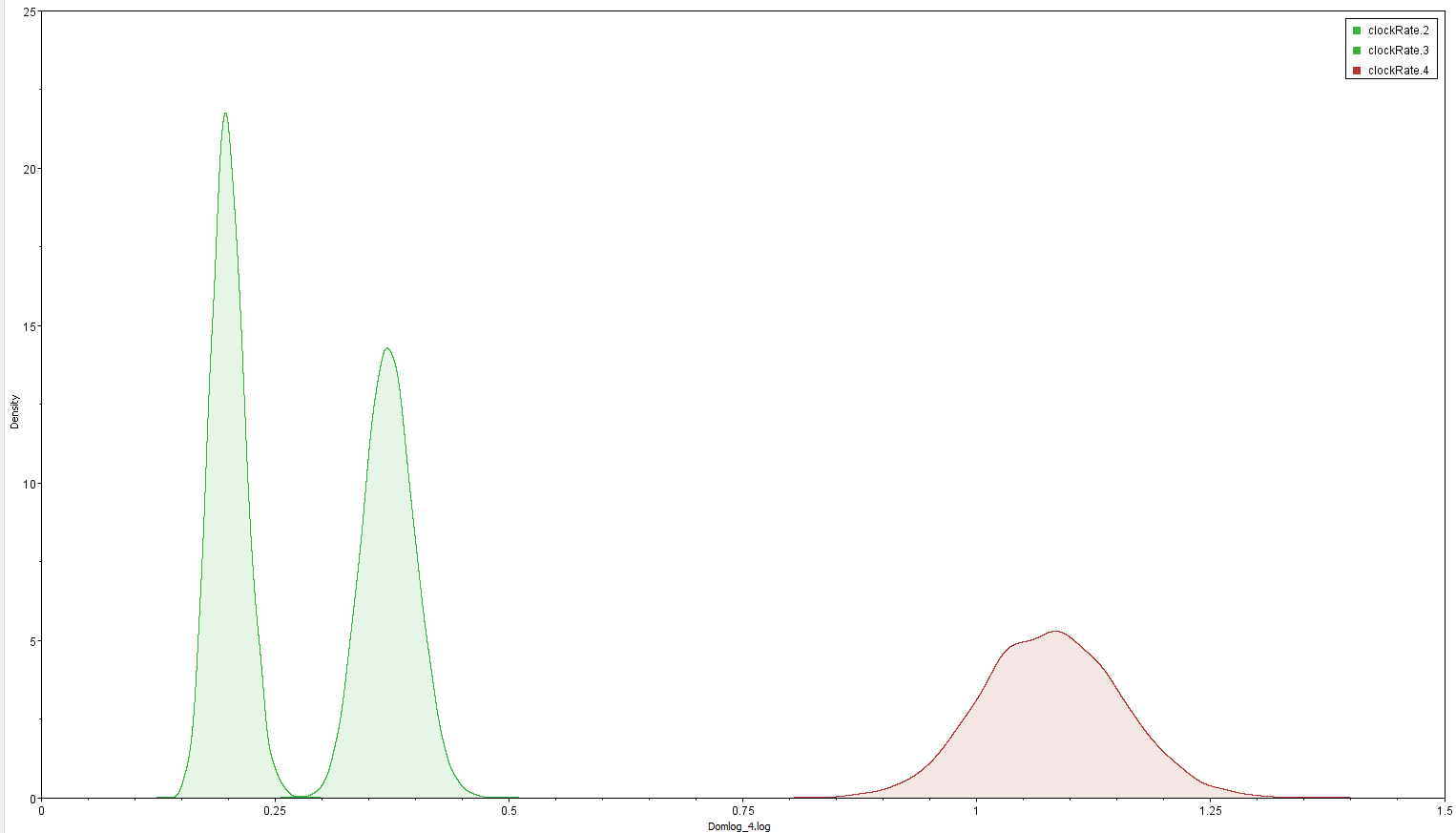
Traces:

Statistic	Mean	ESS	...
posterior	-44924.276	2615	R
likelihood	-45425.565	1771	R
prior	501.289	4679	R
treeLikelihood.1	-3286.369	1482	R
treeLikelihood.2	-19522.123	355	R
treeLikelihood.3	-7335.03	1735	R
treeLikelihood.4	-15282.043	305	R
clockRate.2	0.372	6980	R
clockRate.3	0.2	7039	R
clockRate.4	1.08	6587	R
TreeHeight	2.569E-2	5109	R
rateAC	0.321	6605	R
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rateCG	0.198	4329	R
rateCT	3.159	4135	R
rateGT	0.16	5226	R
substmodel	1.218E5	8685	I
BMT_ModelIndicator	10.76	8434	I
BMT_gammaShape	0.82	4100	R
BMT_ProportionInvariable	0.801	3340	R
hasGammaRates	1	-	*
hasInvariableSites	1	-	*
ActivePropInvariable	0.801	3340	R
ActiveGammaShape	0.82	4100	R
hasEqualFreqs	0E0	-	*
BMT_frequencies.1	0.363	3129	R
BMT_frequencies.2	0.229	3263	R
BMT_frequencies.3	0.115	2946	R
BMT_frequencies.4	0.293	3437	R
BMT_mutationRate	1	-	*
rateStat.1.mean	0.964	1899	R
rateStat.1.variance	0.962	1097	R
rateStat.1.coefficientOfVari...	0.983	1330	R
CoalescentExponential	503.172	4752	R
ePopSize	5.302E-2	5896	R
growthRate	62.105	9001	R

Type: (R)real (I)nt (C)at (T)ime * constant

Estimates Marginal Density Joint-Marginal Trace

Display: KDE



LogCombiner

TreeAnnotator

DensiTree

