mcmc_analysis_mice_M_baysian

November 24, 2025

1 # 1. Density coner plot

A sample is 1 parameter set scanned. For the corner plot below, the quantiles (represented by the solid lines) are 0.16,0.5,0.84 of the samples. Dots represent individual samples (outside the line surrounding 0.84 of the samples) The parameter search is performed in the transformed space of x_c/η, β/η, x_c^2/ϵ, x_c but we also show the regular parameters

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WARNING:root:Too few points to create valid contours

WARNING:root:Too few points to create valid contours

WARNING:root:Too few points to create valid contours

(16,)
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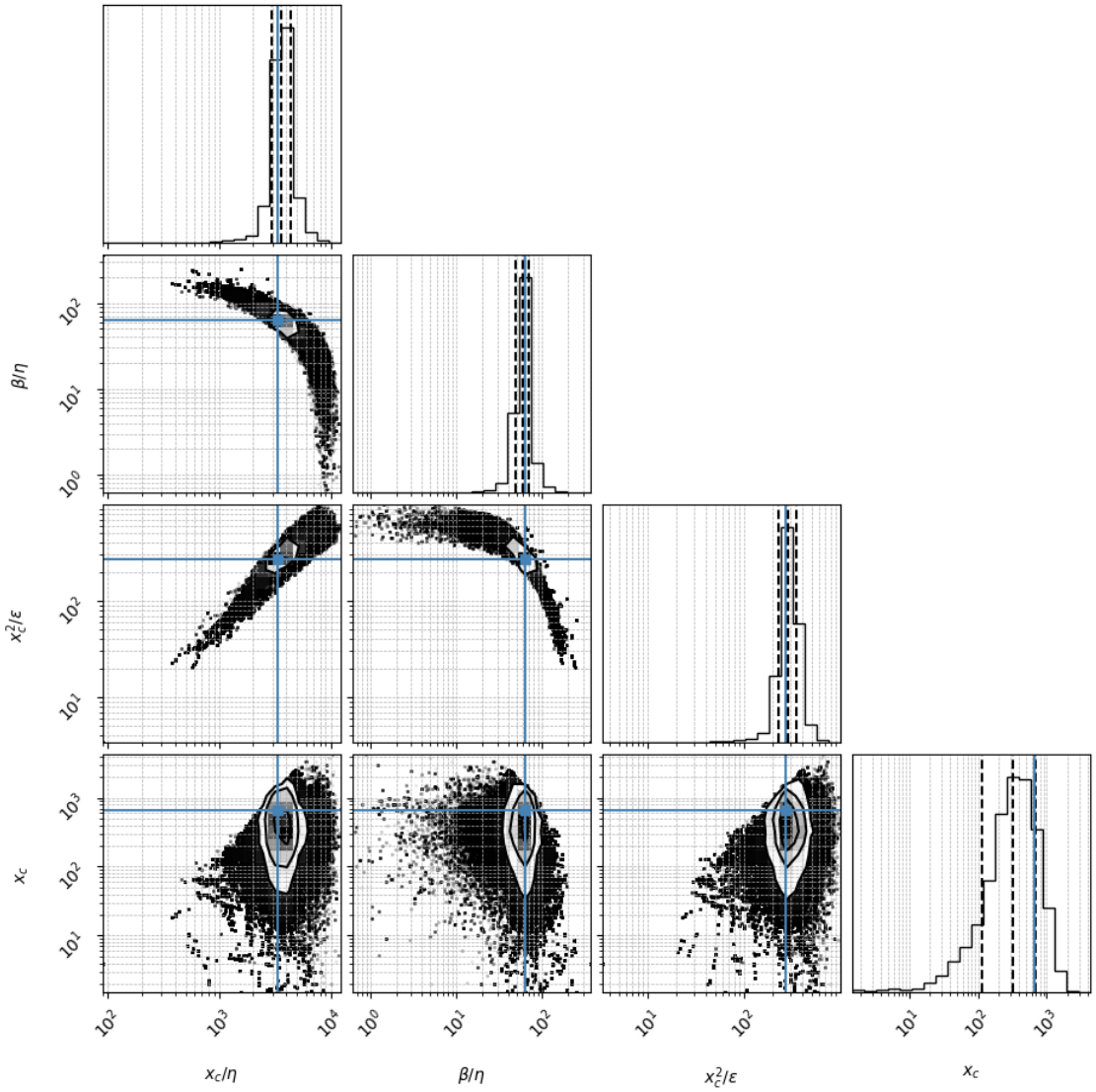
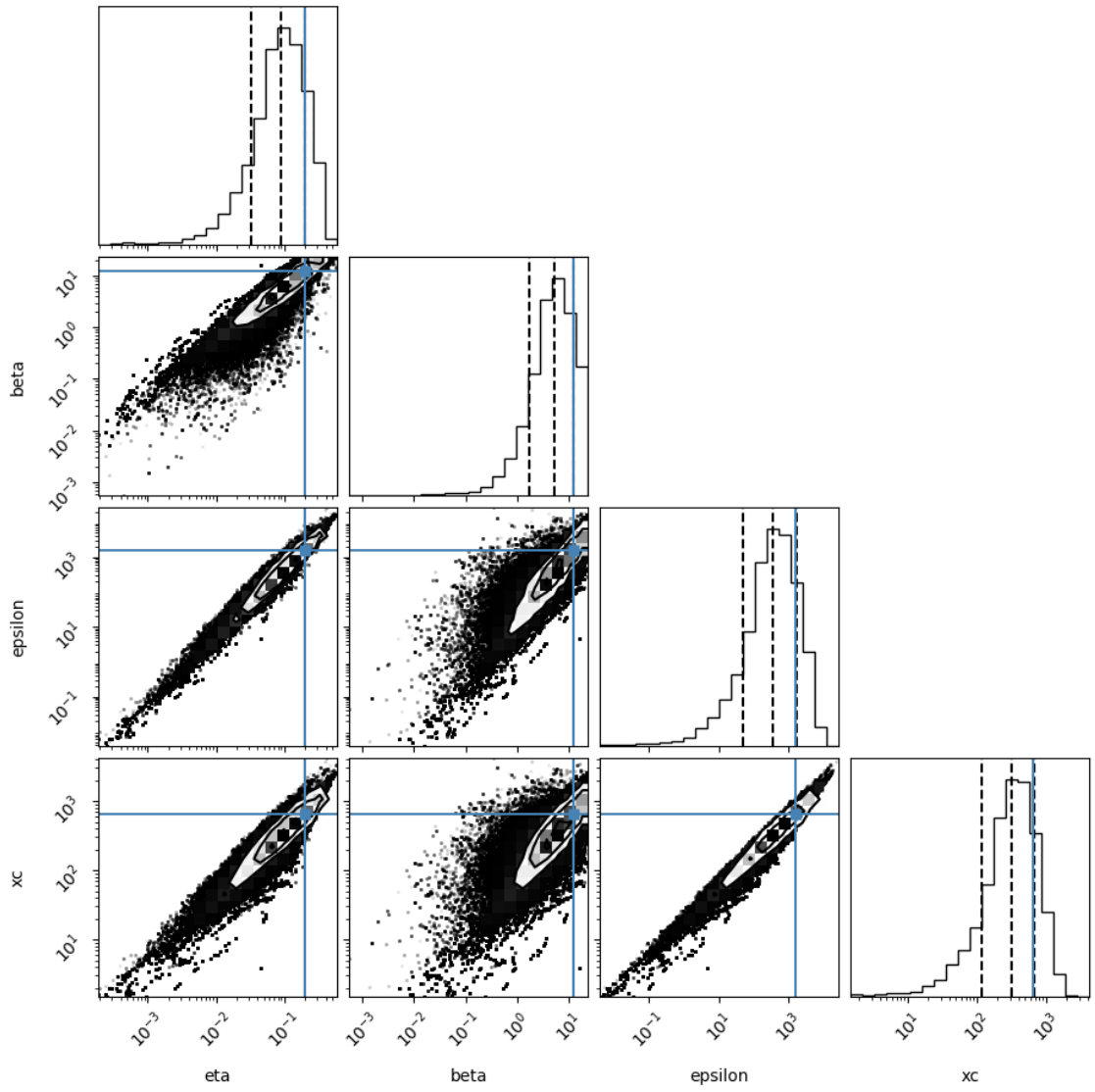
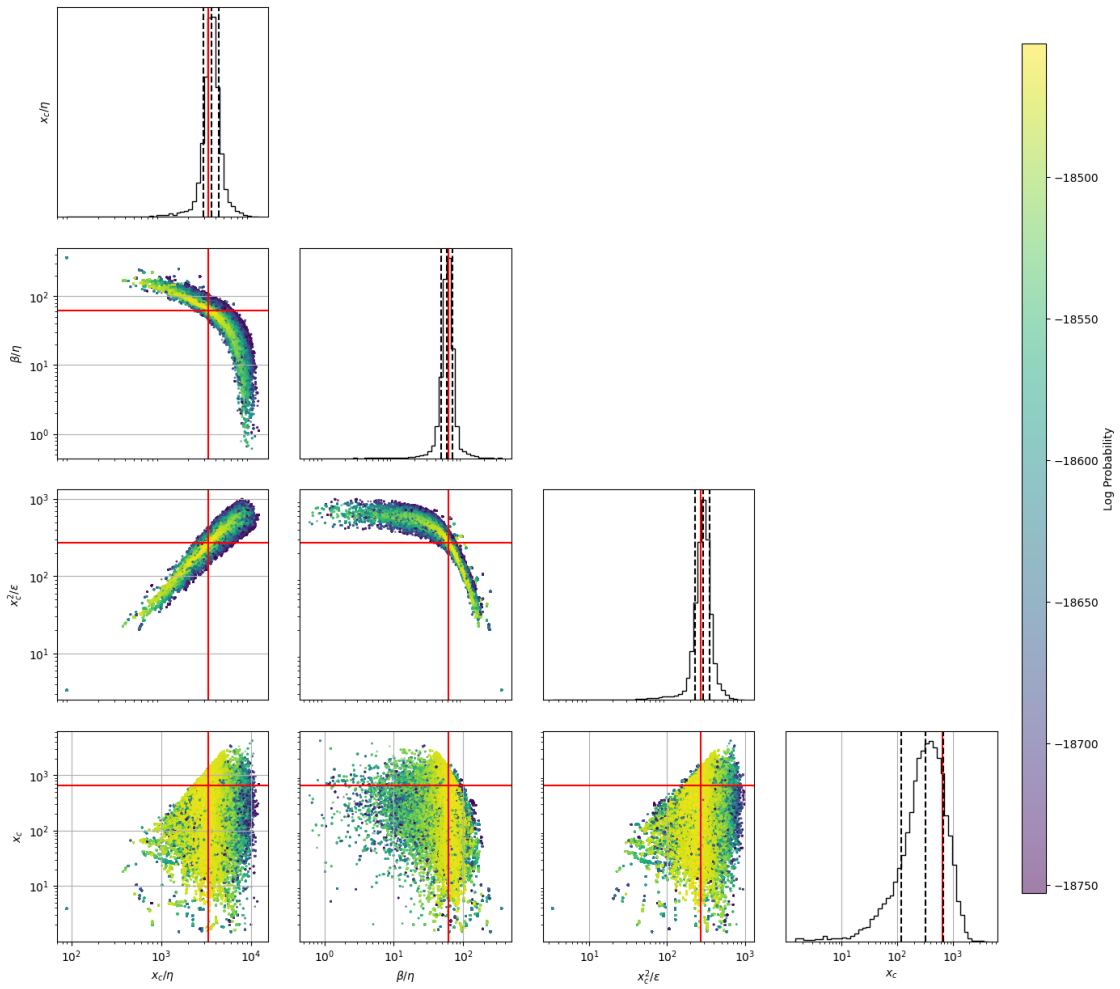

x_c/η
β/η
x_c^2/ε
x_c



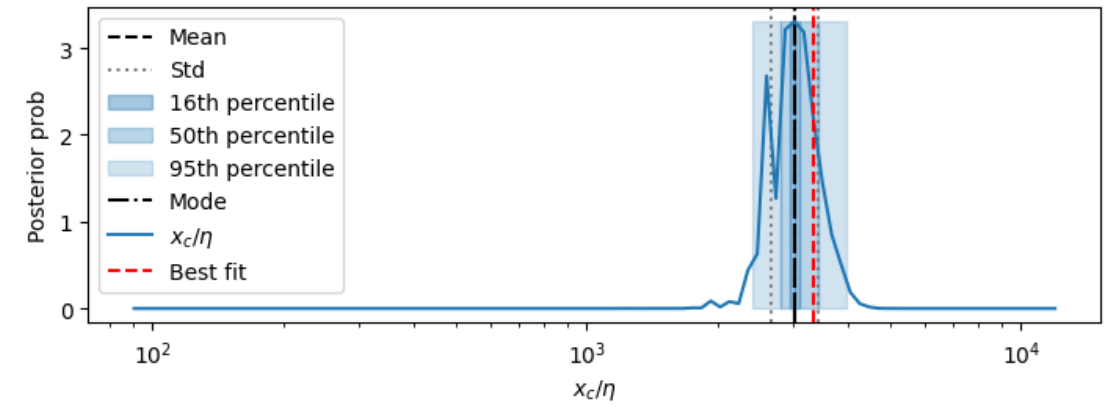
2 2. Heat map corner plot of raw samples

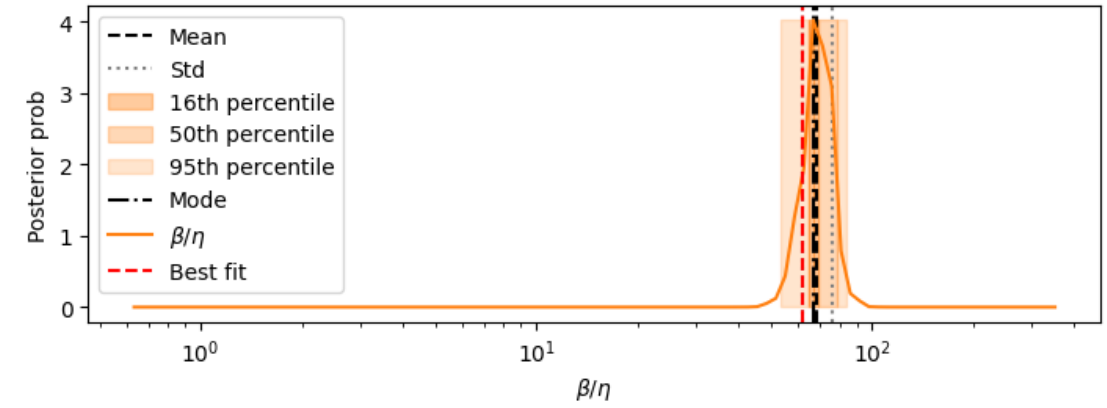
This plot shows all the raw sample points and their lnprobability

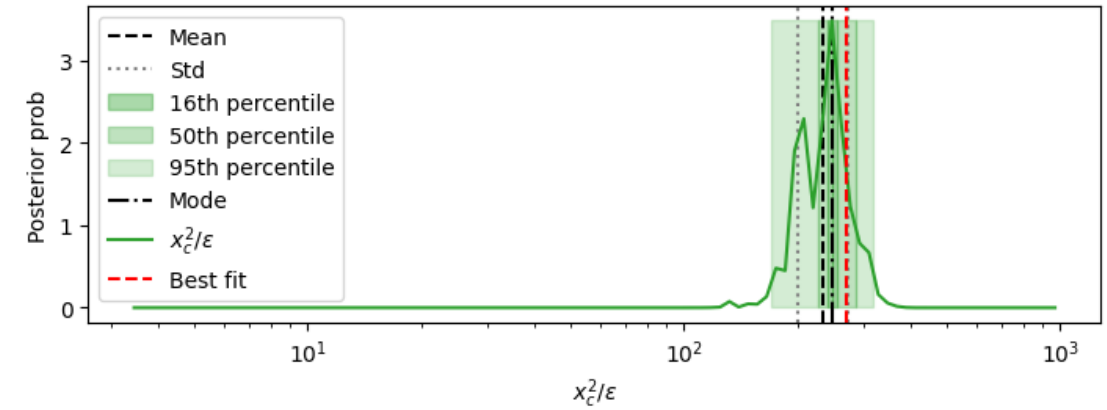


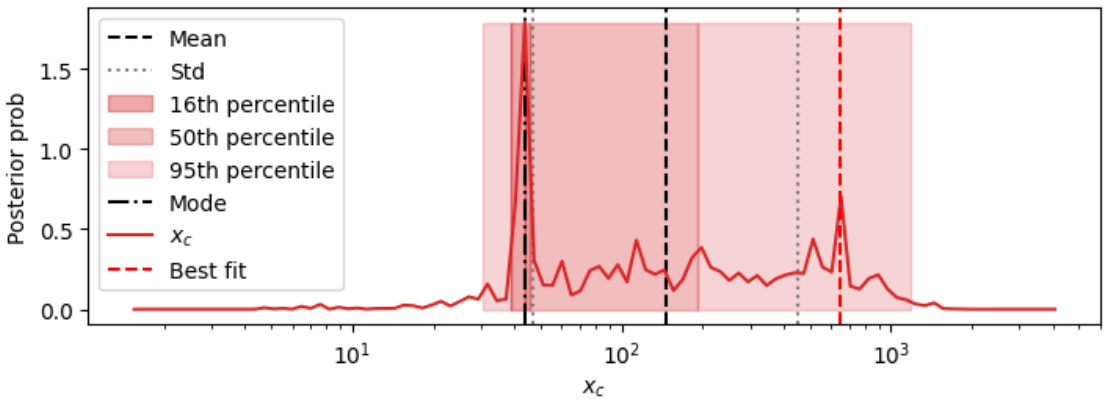
3 3. Posterior distributions of parameters

1d marginalizations of posterior distributions. we use a grid of size nbins=100-150


Mean
Std
16th percentile
50th percentile
95th percentile
Mode
x_c/η
Best fit
Posterior prob
x_c/η

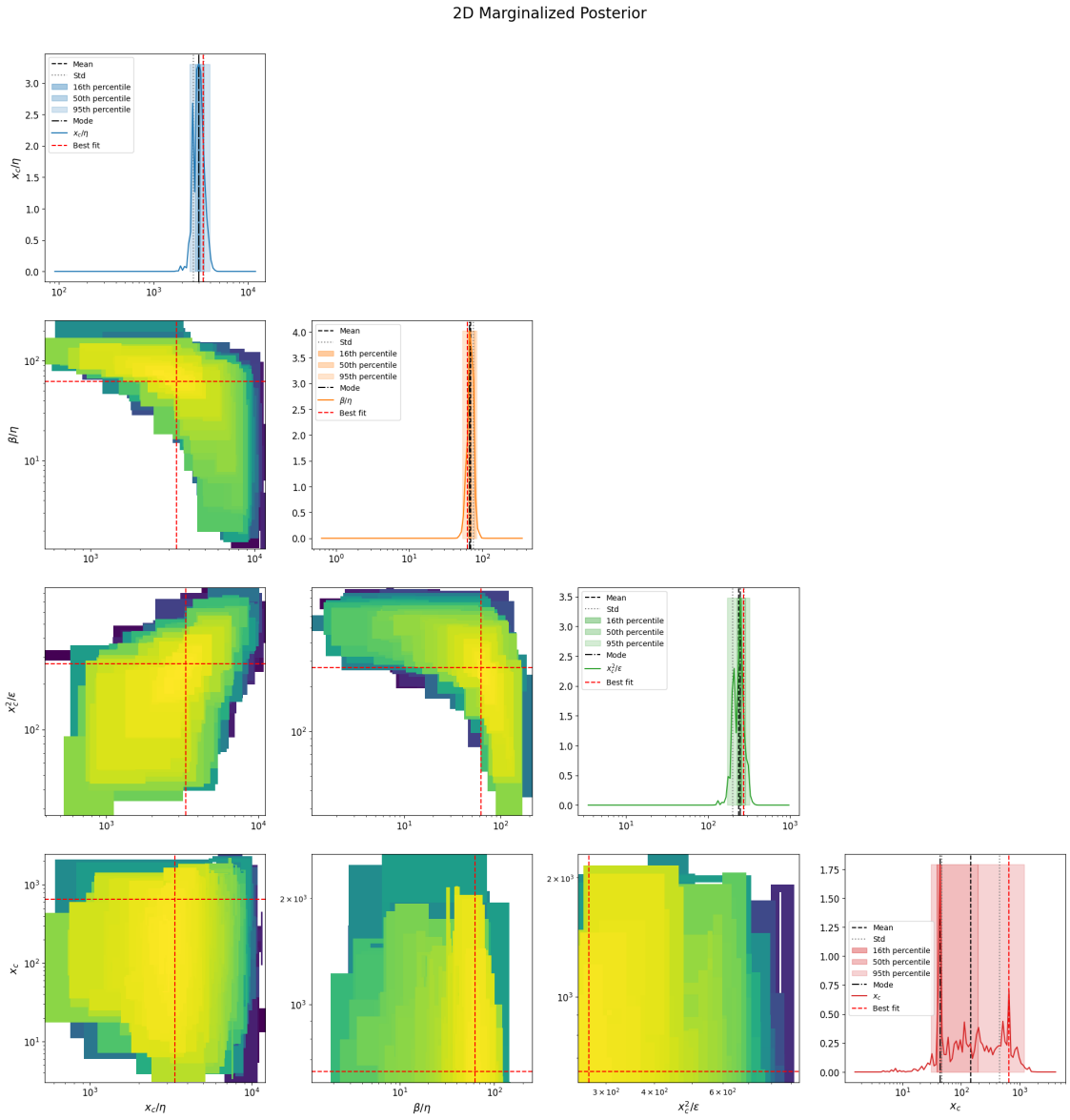

Mean
Std
16th percentile
50th percentile
95th percentile
Mode
β/η
Best fit
Posterior prob
β/η


Mean
Std
16th percentile
50th percentile
95th percentile
Mode
x_c^2/ε
Best fit
Posterior prob
x_c^2/ε


Mean
Std
16th percentile
50th percentile
95th percentile
Mode
x_c
Best fit
Posterior prob
x_c

2D marginalizations of posterior distributions

```
/Volumes/alon/navehr/SRtools/SRtools/samples_utils.py:474: UserWarning: The
input coordinates to pcolormesh are interpreted as cell centers, but are not
monotonically increasing or decreasing. This may lead to incorrectly calculated
cell edges, in which case, please supply explicit cell edges to pcolormesh.
  ax.pcolormesh(X, Y, Z, **kwargs)
```




```
Rescaling the samples TIME by 7
```

4 4. Table of results

mode is the marginalized mode, max_likwlihood is the sample with highest likelihood mode_overall is the 4D posterior mode

	mean	\
xc/eta	3005.68	
beta/eta	68.698	
xc^2/epsilon	234.762	
xc	145.78	
eta	0.0504	
beta	3.398	
epsilon	97.269	
sqrt(xc/eta)	55.343	
s= eta^0.5*xc^1.5/epsilon	4.334	
beta*xc/epsilon	5.3	
eta*xc/epsilon	0.0784	
Fx=beta^2/eta*xc	1.471	
Dx =beta*epsilon/eta*xc^2	0.277	
Pk=beta*k/epsilon	0.0196	
Fk=beta^2/eta*k	436.317	
Dk =beta*epsilon/eta*k^2	18433.105	
Fk^2/Dk=beta^3/eta*epsilon	8.468	
epsilon/beta^2	8.373	
k/beta	0.183	
k^2/epsilon	0.00386	
eta/xc	0.000333	
beta/xc	0.0229	
epsilon/xc^2	0.00426	
k/xc	0.00371	
best fit no ext hazard_MedianLifetime	107.02	
best fit no ext hazard_MaxLifetime	214.0	
best fit_MedianLifetime	107.11	
best fit_MaxLifetime	211.17	
data_MedianLifetime	110.0	
data_MaxLifetime	191.14	
ML_lnprob	-18452.720353	

	std	\
xc/eta	[355.366, 403.015]	
beta/eta	[6.667, 7.383]	
xc^2/epsilon	[33.517, 39.099]	
xc	[98.879, 307.339]	
eta	[0.0349, 0.114]	
beta	[2.348, 7.594]	
epsilon	[88.248, 951.476]	
sqrt(xc/eta)	[3.368, 3.587]	

s= eta^0.5*xc^1.5/epsilon	[0.367, 0.401]
beta*xc/epsilon	[0.433, 0.471]
eta*xc/epsilon	[0.00269, 0.00278]
Fx=beta^2/eta*xc	[0.386, 0.523]
Dx =beta*epsilon/eta*xc^2	[0.0605, 0.0774]
Pk=beta*k/epsilon	[0.0138, 0.0467]
Fk=beta^2/eta*k	[296.583, 926.078]
Dk =beta*epsilon/eta*k^2	[16510.47, 158292.777]
Fk^2/Dk=beta^3/eta*epsilon	[2.693, 3.948]
epsilon/beta^2	[2.085, 2.776]
k/beta	[0.13, 0.453]
k^2/epsilon	[0.00354, 0.0425]
eta/xc	[3.96e-05, 4.49e-05]
beta/xc	[0.00456, 0.00569]
epsilon/xc^2	[0.000611, 0.000713]
k/xc	[0.00252, 0.00792]
best fit no ext hazard_MedianLifetime	0.51
best fit no ext hazard_MaxLifetime	0
best fit_MedianLifetime	0.51
best fit_MaxLifetime	0
data_MedianLifetime	0.52
data_MaxLifetime	0
ML_lnprob	[-18452.720352933, -18452.720352933]

	mode \
xc/eta	3012.333
beta/eta	66.802
xc^2/epsilon	247.259
xc	43.722
eta	0.031
beta	3.629
epsilon	73.25
sqrt(xc/eta)	56.255
s= eta^0.5*xc^1.5/epsilon	4.336
beta*xc/epsilon	5.298
eta*xc/epsilon	0.0809
Fx=beta^2/eta*xc	1.456
Dx =beta*epsilon/eta*xc^2	0.219
Pk=beta*k/epsilon	0.0739
Fk=beta^2/eta*k	197.388
Dk =beta*epsilon/eta*k^2	1975.989
Fk^2/Dk=beta^3/eta*epsilon	7.305
epsilon/beta^2	8.261
k/beta	0.495
k^2/epsilon	0.0265
eta/xc	0.000349
beta/xc	0.0229

epsilon/xc^2	0.00404
k/xc	0.0114
best fit no ext hazard_MedianLifetime	107.02
best fit no ext hazard_MaxLifetime	214.0
best fit_MedianLifetime	107.11
best fit_MaxLifetime	211.17
data_MedianLifetime	110.0
data_MaxLifetime	191.14
ML_lnprob	-18452.720353

	percentile_16 \
xc/eta	[2938.961, 3087.537]
beta/eta	[64.705, 68.968]
xc^2/epsilon	[240.319, 254.401]
xc	[38.805, 45.495]
eta	[0.0275, 0.0445]
beta	[2.499, 3.828]
epsilon	[49.374, 127.244]
sqrt(xc/eta)	[55.566, 56.953]
s= eta^0.5*xc^1.5/epsilon	[4.262, 4.412]
beta*xc/epsilon	[5.139, 5.463]
eta*xc/epsilon	[0.0792, 0.0814]
Fx=beta^2/eta*xc	[1.334, 1.589]
Dx =beta*epsilon/eta*xc^2	[0.207, 0.232]
Pk=beta*k/epsilon	[0.0691, 0.0901]
Fk=beta^2/eta*k	[182.263, 250.717]
Dk =beta*epsilon/eta*k^2	[1814.071, 2553.735]
Fk^2/Dk=beta^3/eta*epsilon	[6.491, 8.221]
epsilon/beta^2	[7.578, 9.005]
k/beta	[0.422, 0.58]
k^2/epsilon	[0.0245, 0.0393]
eta/xc	[0.00034, 0.000357]
beta/xc	[0.0217, 0.0242]
epsilon/xc^2	[0.00393, 0.00416]
k/xc	[0.0102, 0.0119]
best fit no ext hazard_MedianLifetime	[106.53, 107.53]
best fit no ext hazard_MaxLifetime	[214.0, 214.0]
best fit_MedianLifetime	[106.62, 107.62]
best fit_MaxLifetime	[211.17, 211.17]
data_MedianLifetime	[109.52, 110.52]
data_MaxLifetime	[191.14, 191.14]
ML_lnprob	[-18452.720352933, -18452.720352933]

	percentile_50 \
xc/eta	[2797.535, 3407.602]
beta/eta	[64.705, 78.357]
xc^2/epsilon	[227.016, 285.088]

xc	[38.805, 190.422]
eta	[0.0184, 0.126]
beta	[1.467, 8.98]
epsilon	[49.374, 2177.997]
sqrt(xc/eta)	[52.892, 58.375]
s= eta^0.5*xc^1.5/epsilon	[4.118, 4.727]
beta*xc/epsilon	[5.139, 5.808]
eta*xc/epsilon	[0.077, 0.0814]
Fx=beta^2/eta*xc	[1.12, 1.893]
Dx =beta*epsilon/eta*xc^2	[0.207, 0.328]
Pk=beta*k/epsilon	[0.0141, 0.0901]
Fk=beta^2/eta*k	[182.263, 1052.862]
Dk =beta*epsilon/eta*k^2	[1086.105, 27978.652]
Fk^2/Dk=beta^3/eta*epsilon	[6.491, 10.413]
epsilon/beta^2	[7.578, 10.7]
k/beta	[0.131, 0.889]
k^2/epsilon	[0.000761, 0.0393]
eta/xc	[0.000293, 0.000357]
beta/xc	[0.0217, 0.0303]
epsilon/xc^2	[0.00371, 0.00466]
k/xc	[0.00263, 0.0129]
best fit no ext hazard_MedianLifetime	[106.53, 107.53]
best fit no ext hazard_MaxLifetime	[214.0, 214.0]
best fit_MedianLifetime	[106.62, 107.62]
best fit_MaxLifetime	[211.17, 211.17]
data_MedianLifetime	[109.52, 110.52]
data_MaxLifetime	[191.14, 191.14]
ML_lnprob	[-18452.720352933, -18452.720352933]

	percentile_95 \
xc/eta	[2412.795, 3950.972]
beta/eta	[53.431, 83.521]
xc^2/epsilon	[170.768, 319.477]
xc	[30.568, 1186.249]
eta	[0.00822, 0.39]
beta	[0.505, 23.436]
epsilon	[2.464, 7695.628]
sqrt(xc/eta)	[47.924, 62.857]
s= eta^0.5*xc^1.5/epsilon	[3.587, 5.242]
beta*xc/epsilon	[4.276, 6.175]
eta*xc/epsilon	[0.0727, 0.0838]
Fx=beta^2/eta*xc	[0.789, 2.687]
Dx =beta*epsilon/eta*xc^2	[0.164, 0.414]
Pk=beta*k/epsilon	[0.00194, 0.117]
Fk=beta^2/eta*k	[70.023, 3769.775]
Dk =beta*epsilon/eta*k^2	[1086.105, 1428318.027]
Fk^2/Dk=beta^3/eta*epsilon	[3.194, 16.705]

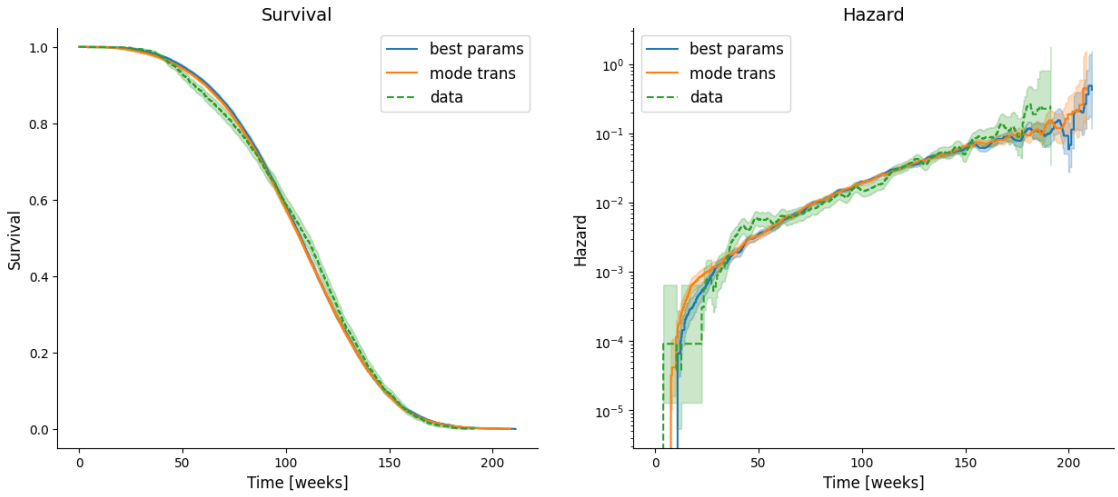
epsilon/beta^2	[4.516, 15.11]
k/beta	[0.0213, 1.1]
k^2/epsilon	[4.45e-05, 0.139]
eta/xc	[0.000266, 0.000435]
beta/xc	[0.0139, 0.0338]
epsilon/xc^2	[0.00313, 0.00586]
k/xc	[0.000456, 0.0192]
best fit no ext hazard_MedianLifetime	[106.53, 107.53]
best fit no ext hazard_MaxLifetime	[214.0, 214.0]
best fit_MedianLifetime	[106.62, 107.62]
best fit_MaxLifetime	[211.17, 211.17]
data_MedianLifetime	[109.52, 110.52]
data_MaxLifetime	[191.14, 191.14]
ML_lnprob	[-18452.720352933, -18452.720352933]

	max_likelihood	mode_overall
xc/eta	3342.547	2590.975
beta/eta	62.291	76.96
xc^2/epsilon	270.861	199.518
xc	647.279	42.637
eta	0.194	0.279
beta	12.062	18.937
epsilon	1546.808	3360.905
sqrt(xc/eta)	57.815	55.177
s= eta^0.5*xc^1.5/epsilon	4.685	4.369
beta*xc/epsilon	5.048	5.408
eta*xc/epsilon	0.081	0.081
Fx=beta^2/eta*xc	1.161	1.161
Dx =beta*epsilon/eta*xc^2	0.23	0.23
Pk=beta*k/epsilon	0.0039	0.0695
Fk=beta^2/eta*k	1502.758	194.931
Dk =beta*epsilon/eta*k^2	385406.248	2034.411
Fk^2/Dk=beta^3/eta*epsilon	5.859	8.284
epsilon/beta^2	10.631	8.989
k/beta	0.0415	0.485
k^2/epsilon	0.000162	0.0262
eta/xc	0.000299	0.000386
beta/xc	0.0186	0.0297
epsilon/xc^2	0.00369	0.00501
k/xc	0.000772	0.0117
best fit no ext hazard_MedianLifetime	107.02	NaN
best fit no ext hazard_MaxLifetime	214.0	NaN
best fit_MedianLifetime	107.11	NaN
best fit_MaxLifetime	211.17	NaN
data_MedianLifetime	110.0	NaN
data_MaxLifetime	191.14	NaN
ML_lnprob	-18452.720353	-18452.720353

5 5. Fits of simulations to data

best params is the sample with highest likelihood. mode trans is the 4D posterior mode in the transformed space of x_c/η, β/η, x_c^2/ϵ, x_c

```
Text(0, 0.5, 'Hazard')
```




```
Text(0, 0.5, 'Prob density')
```