mcmc_analysis_German_Shepherd_vetCompass_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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(25,)
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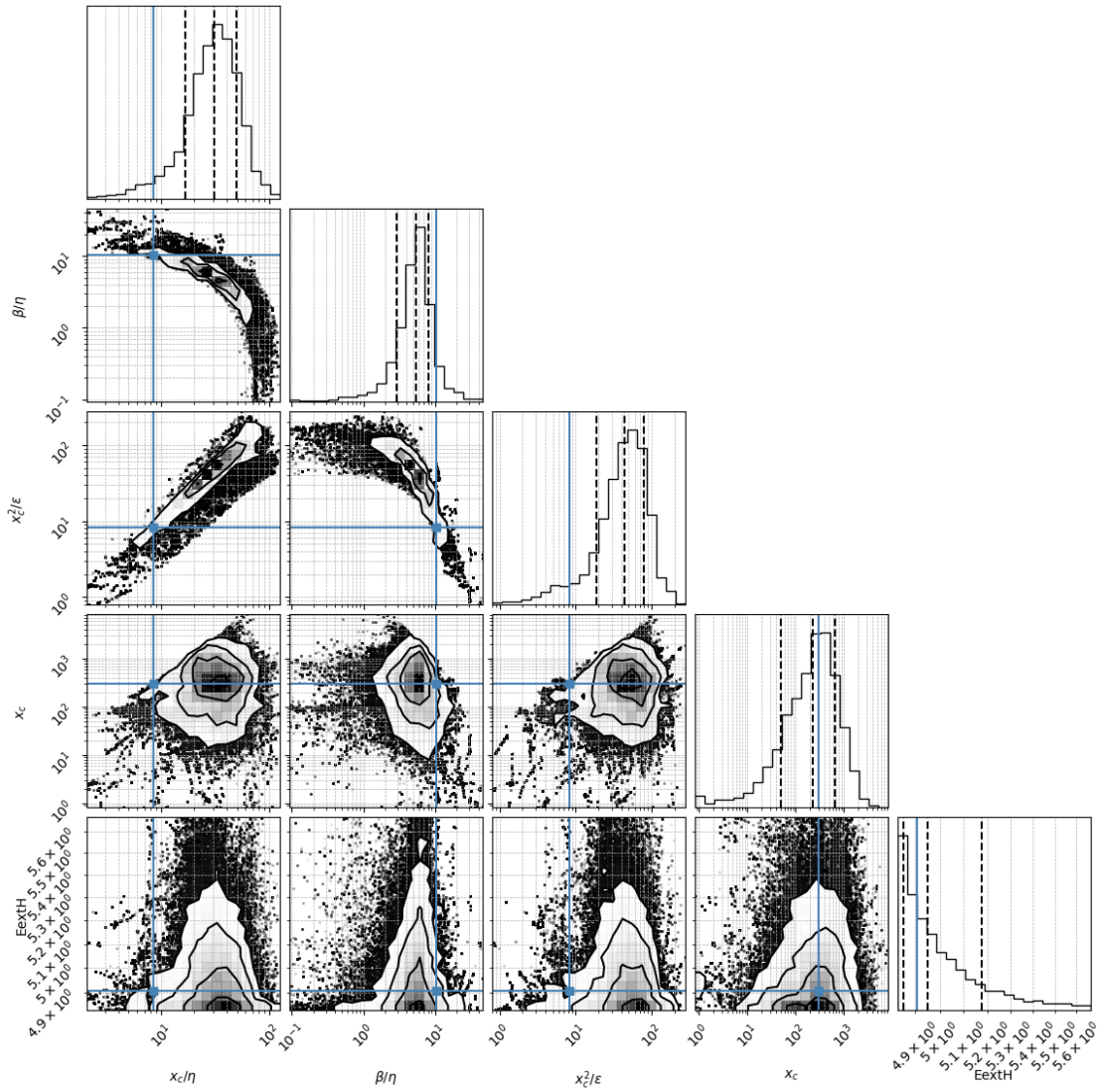
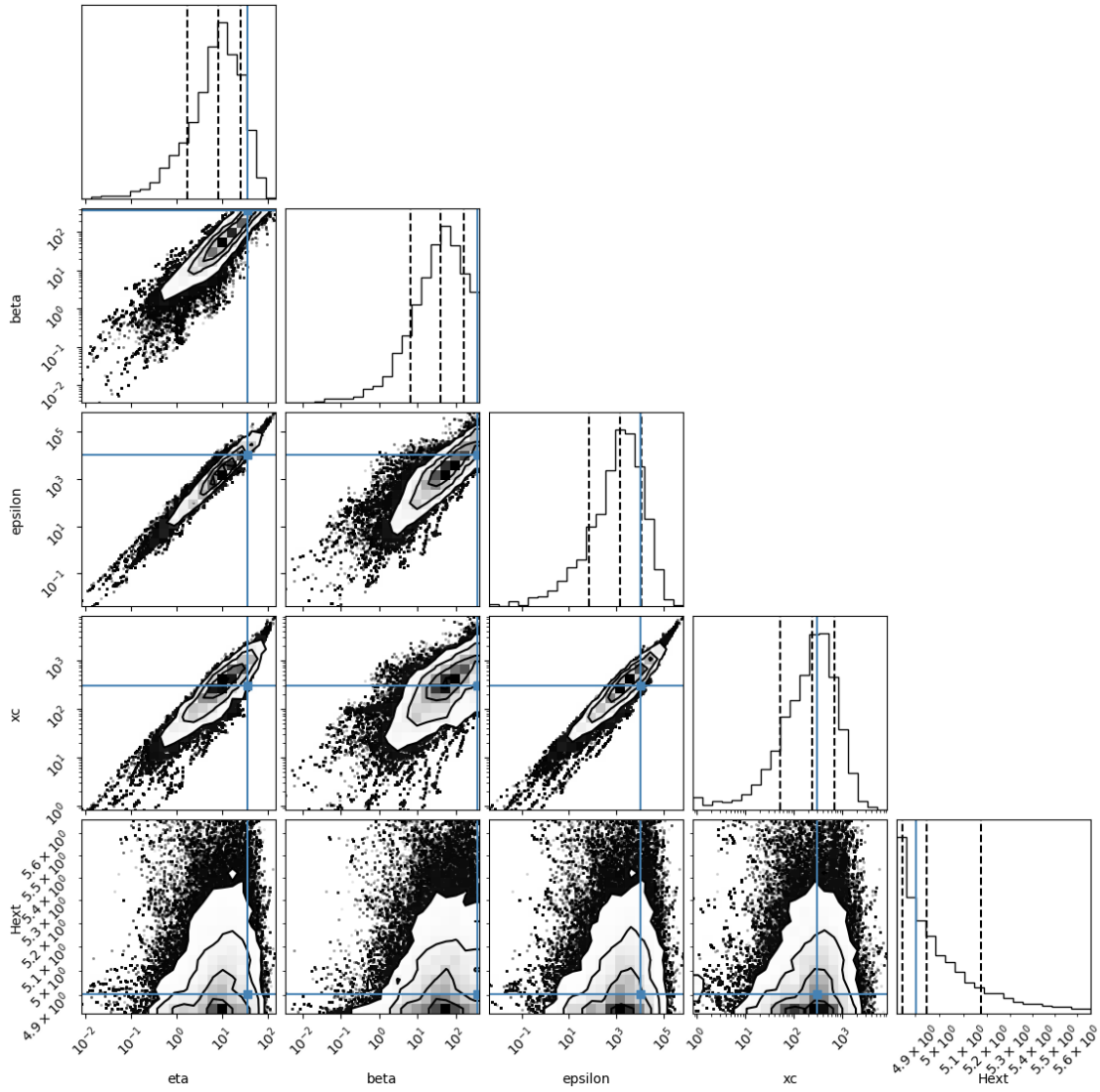
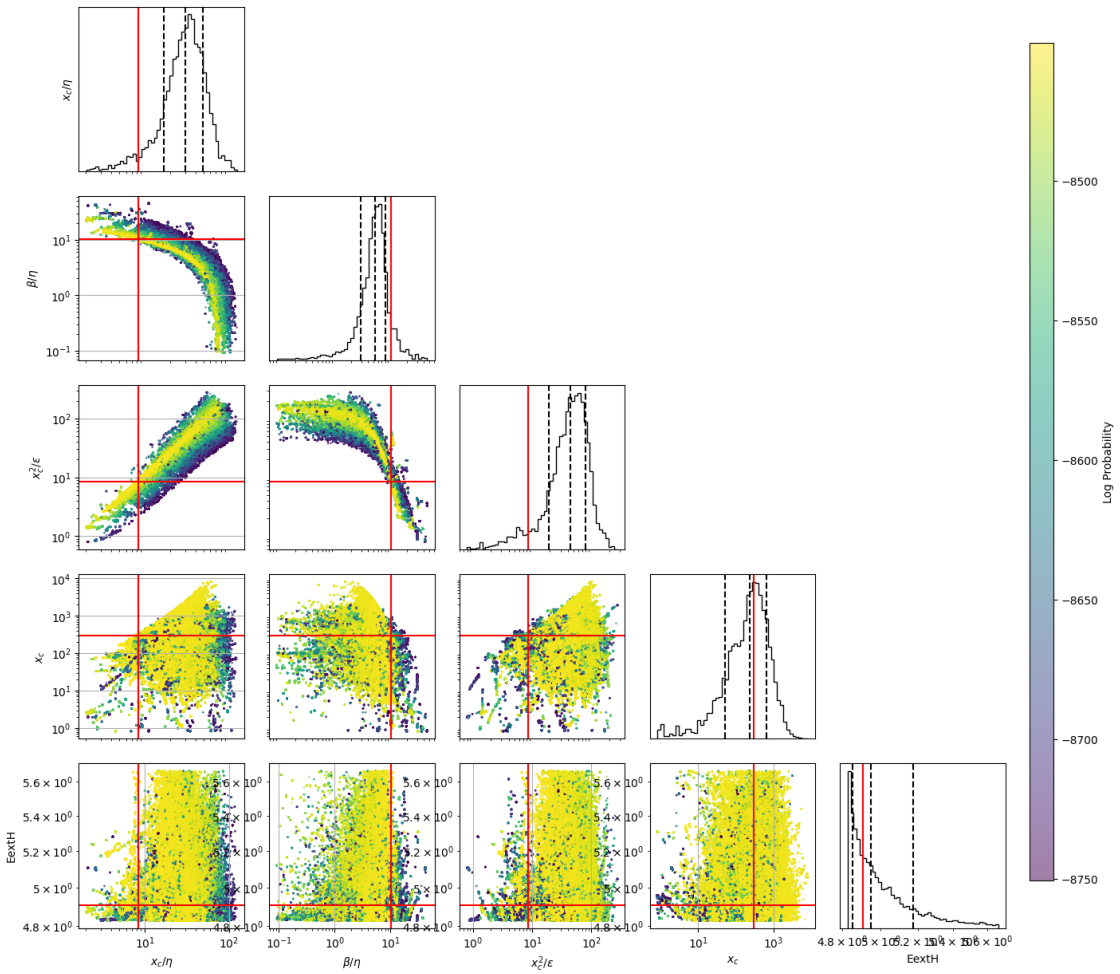

x_c/η
β/η
x_c^2/ε
x_c
EextH



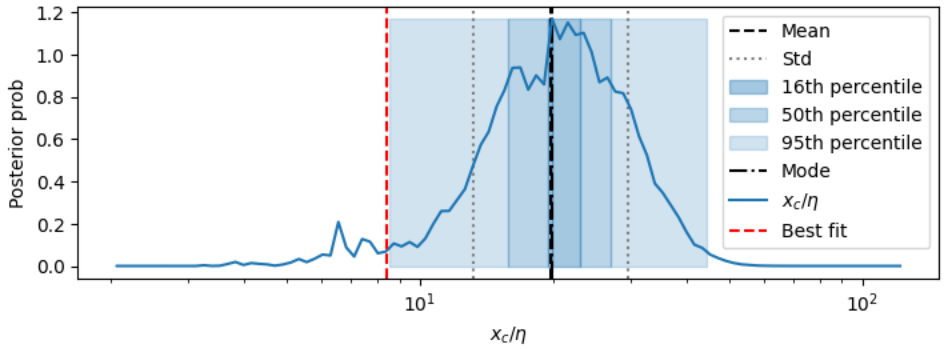
2 2. Heat map corner plot of raw samples

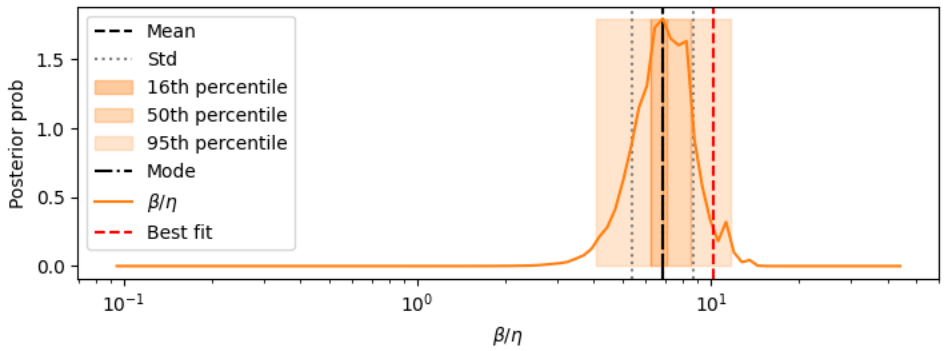
This plot shows all the raw sample points and their lnprobability

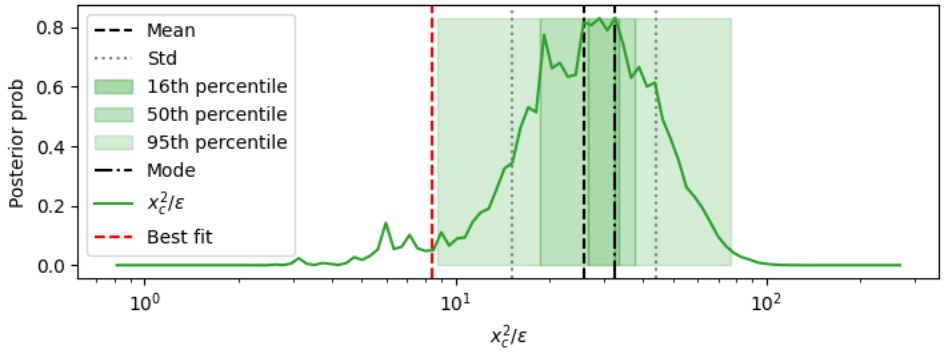


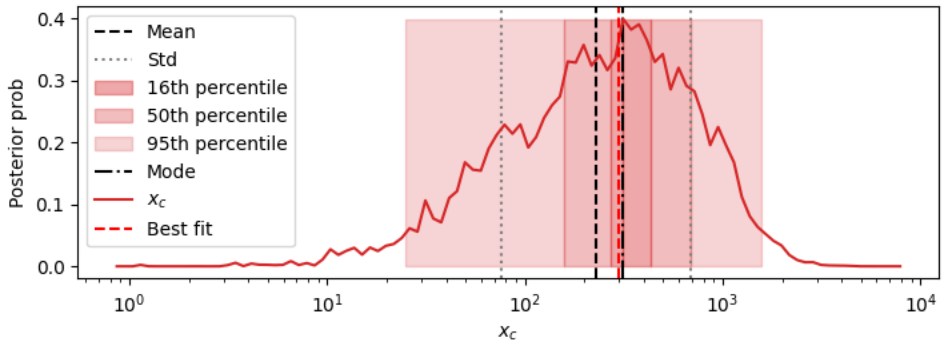
3 3. Posterior distributions of parameters

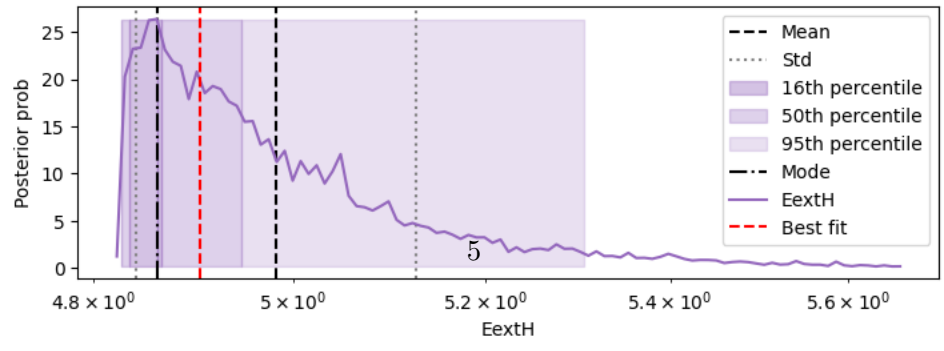
1d marginalizations of posterior distributions. we use a grid of size nbins=100-150


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


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


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


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


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

2D marginalizations of posterior distributions

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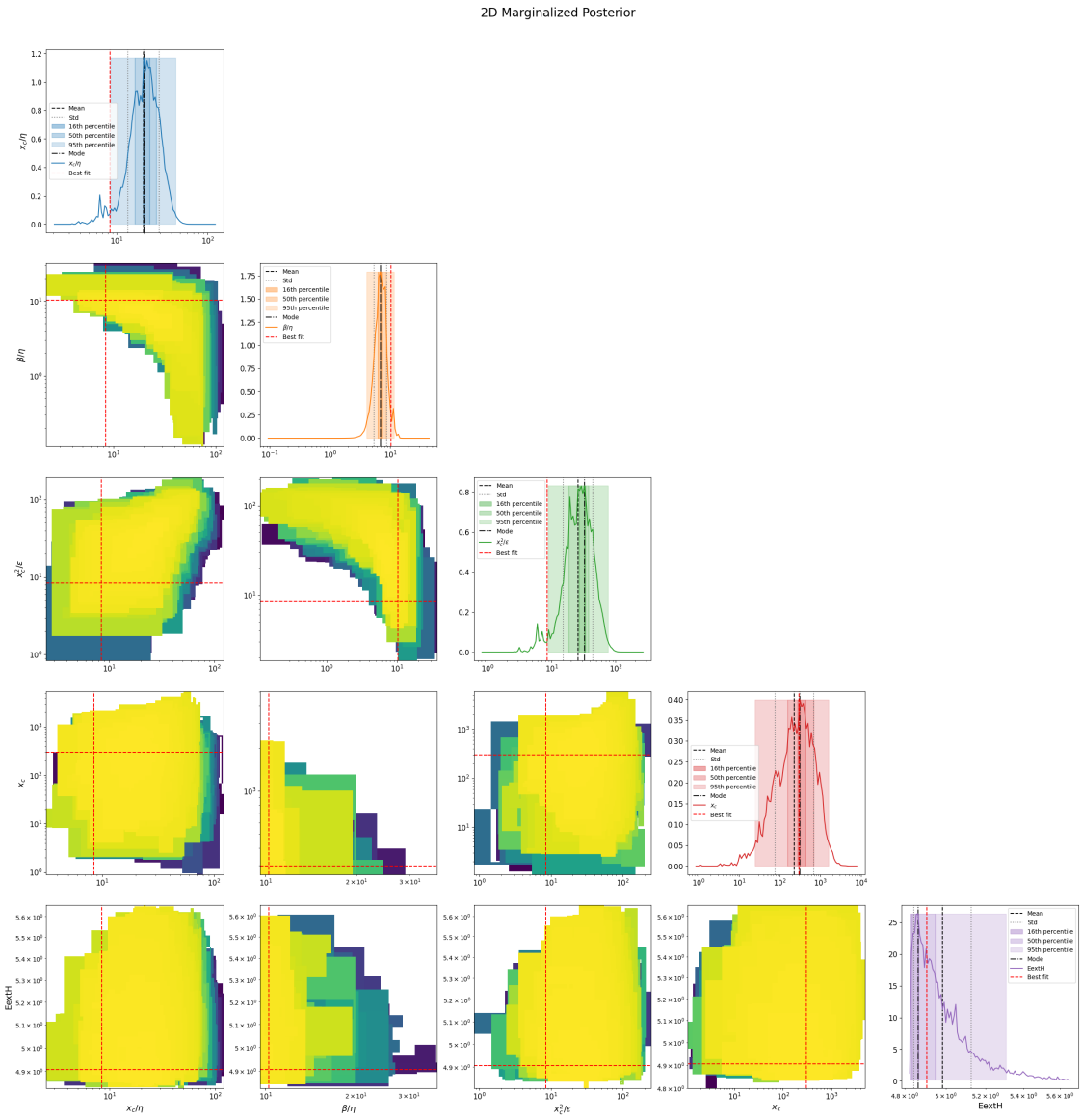
/Volumes/alon/navehr/SRtools/SRtools/samples_utils.py:474: UserWarning: The
input coordinates to pcolormesh are interpreted as cell centers, but are not
monotonically increasing or decreasing. This may lead to incorrectly calculated
cell edges, in which case, please supply explicit cell edges to pcolormesh.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

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Rescaling the samples TIME by 365
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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	19.787	
beta/eta	6.848	
xc^2/epsilon	25.942	
xc	227.531	
ExtH	4.983	
eta	11.092	
beta	76.86	
epsilon	1831.616	
sqrt(xc/eta)	4.449	
s= eta^0.5*xc^1.5/epsilon	5.835	
beta*xc/epsilon	8.98	
eta*xc/epsilon	1.311	
Fx=beta^2/eta*xc	2.37	
Dx =beta*epsilon/eta*xc^2	0.264	
Pk=beta*k/epsilon	0.0206	
Fk=beta^2/eta*k	1052.765	
Dk =beta*epsilon/eta*k^2	52060.789	
Fk^2/Dk=beta^3/eta*epsilon	21.595	
epsilon/beta^2	0.315	
k/beta	0.00647	
k^2/epsilon	0.000133	
eta/xc	0.0506	
beta/xc	0.347	
epsilon/xc^2	0.0386	
k/xc	0.00219	
best fit no ext hazard_MedianLifetime	10.98	
best fit no ext hazard_MaxLifetime	18.63	
best fit_MedianLifetime	10.75	
best fit_MaxLifetime	18.02	
data_MedianLifetime	10.73	
data_MaxLifetime	19.0	
ML_lnprob	-8450.484467	

	std	\
xc/eta	[6.524, 9.734]	
beta/eta	[1.465, 1.864]	
xc^2/epsilon	[10.728, 18.294]	
xc	[151.851, 456.542]	
ExtH	[0.141, 0.145]	
eta	[7.33, 21.614]	
beta	[51.47, 155.812]	

epsilon	[1621.731, 14152.448]
sqrt(xc/eta)	[0.807, 0.986]
s= eta^0.5*xc^1.5/epsilon	[1.66, 2.319]
beta*xc/epsilon	[1.021, 1.152]
eta*xc/epsilon	[0.17, 0.195]
Fx=beta^2/eta*xc	[1.384, 3.323]
Dx =beta*epsilon/eta*xc^2	[0.142, 0.307]
Pk=beta*k/epsilon	[0.0142, 0.0459]
Fk=beta^2/eta*k	[728.363, 2363.721]
Dk =beta*epsilon/eta*k^2	[45873.482, 385985.284]
Fk^2/Dk=beta^3/eta*epsilon	[13.519, 36.151]
epsilon/beta^2	[0.165, 0.347]
k/beta	[0.00431, 0.0129]
k^2/epsilon	[0.000117, 0.001]
eta/xc	[0.0167, 0.0249]
beta/xc	[0.163, 0.307]
epsilon/xc^2	[0.016, 0.0272]
k/xc	[0.00146, 0.00439]
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	0.53
data_MaxLifetime	0
ML_lnprob	[-8450.4844673953, -8450.4844673953]

	mode \
xc/eta	19.906
beta/eta	6.862
xc^2/epsilon	32.639
xc	313.914
ExtH	4.863
eta	19.922
beta	138.136
epsilon	7920.139
sqrt(xc/eta)	4.462
s= eta^0.5*xc^1.5/epsilon	6.498
beta*xc/epsilon	9.552
eta*xc/epsilon	1.273
Fx=beta^2/eta*xc	2.313
Dx =beta*epsilon/eta*xc^2	0.258
Pk=beta*k/epsilon	0.0139
Fk=beta^2/eta*k	1424.109
Dk =beta*epsilon/eta*k^2	161387.558
Fk^2/Dk=beta^3/eta*epsilon	17.857
epsilon/beta^2	0.319
k/beta	0.00362

k^2/epsilon	0.000031
eta/xc	0.0502
beta/xc	0.282
epsilon/xc^2	0.0306
k/xc	0.00159
best fit no ext hazard_MedianLifetime	10.98
best fit no ext hazard_MaxLifetime	18.63
best fit_MedianLifetime	10.75
best fit_MaxLifetime	18.02
data_MedianLifetime	10.73
data_MaxLifetime	19.0
ML_lnprob	-8450.484467

	percentile_16 \
xc/eta	[19.501, 22.991]
beta/eta	[6.252, 7.078]
xc^2/epsilon	[26.59, 33.609]
xc	[273.397, 433.359]
ExtH	[4.835, 4.867]
eta	[15.586, 25.464]
beta	[130.299, 207.897]
epsilon	[4087.646, 10515.841]
sqrt(xc/eta)	[4.416, 4.795]
s= eta^0.5*xc^1.5/epsilon	[5.832, 6.64]
beta*xc/epsilon	[9.253, 9.861]
eta*xc/epsilon	[1.254, 1.332]
Fx=beta^2/eta*xc	[1.547, 2.506]
Dx =beta*epsilon/eta*xc^2	[0.194, 0.273]
Pk=beta*k/epsilon	[0.0101, 0.0168]
Fk=beta^2/eta*k	[1309.698, 2164.729]
Dk =beta*epsilon/eta*k^2	[146192.885, 392974.516]
Fk^2/Dk=beta^3/eta*epsilon	[16.033, 24.671]
epsilon/beta^2	[0.295, 0.403]
k/beta	[0.0027, 0.00431]
k^2/epsilon	[2.37e-05, 6.11e-05]
eta/xc	[0.0435, 0.0513]
beta/xc	[0.269, 0.362]
epsilon/xc^2	[0.0298, 0.0376]
k/xc	[0.00115, 0.00183]
best fit no ext hazard_MedianLifetime	[10.49, 11.49]
best fit no ext hazard_MaxLifetime	[18.63, 18.63]
best fit_MedianLifetime	[10.26, 11.26]
best fit_MaxLifetime	[18.02, 18.02]
data_MedianLifetime	[10.26, 11.26]
data_MaxLifetime	[19.0, 19.0]
ML_lnprob	[-8450.4844673953, -8450.4844673953]

	percentile_50 \
xc/eta	[15.873, 27.106]
beta/eta	[6.252, 8.527]
xc^2/epsilon	[18.711, 37.785]
xc	[157.301, 686.912]
ExtH	[4.827, 4.947]
eta	[8.648, 37.71]
beta	[57.525, 295.14]
epsilon	[901.322, 18538.151]
sqrt(xc/eta)	[4.067, 5.315]
s= eta^0.5*xc^1.5/epsilon	[4.907, 7.558]
beta*xc/epsilon	[8.682, 9.861]
eta*xc/epsilon	[1.217, 1.504]
Fx=beta^2/eta*xc	[1.547, 4.769]
Dx =beta*epsilon/eta*xc^2	[0.154, 0.431]
Pk=beta*k/epsilon	[0.00689, 0.0361]
Fk=beta^2/eta*k	[670.184, 3577.966]
Dk =beta*epsilon/eta*k^2	[30048.666, 583632.742]
Fk^2/Dk=beta^3/eta*epsilon	[12.925, 47.093]
epsilon/beta^2	[0.185, 0.471]
k/beta	[0.00169, 0.00869]
k^2/epsilon	[1.35e-05, 0.000277]
eta/xc	[0.0354, 0.0605]
beta/xc	[0.22, 0.54]
epsilon/xc^2	[0.025, 0.0504]
k/xc	[0.000728, 0.00318]
best fit no ext hazard_MedianLifetime	[10.49, 11.49]
best fit no ext hazard_MaxLifetime	[18.63, 18.63]
best fit_MedianLifetime	[10.26, 11.26]
best fit_MaxLifetime	[18.02, 18.02]
data_MedianLifetime	[10.26, 11.26]
data_MaxLifetime	[19.0, 19.0]
ML_lnprob	[-8450.4844673953, -8450.4844673953]

	percentile_95 \
xc/eta	[8.561, 44.422]
beta/eta	[4.048, 11.631]
xc^2/epsilon	[8.739, 76.304]
xc	[24.918, 1573.974]
ExtH	[4.827, 5.306]
eta	[1.339, 67.963]
beta	[8.876, 418.994]
epsilon	[30.029, 84073.576]
sqrt(xc/eta)	[2.866, 6.529]
s= eta^0.5*xc^1.5/epsilon	[2.922, 11.151]
beta*xc/epsilon	[6.73, 11.2]
eta*xc/epsilon	[0.984, 1.75]

Fx=beta^2/eta*xc	[0.364, 17.264]
Dx =beta*epsilon/eta*xc^2	[0.0491, 1.352]
Pk=beta*k/epsilon	[0.00249, 0.215]
Fk=beta^2/eta*k	[106.172, 8267.174]
Dk =beta*epsilon/eta*k^2	[854.767, 1911901.134]
Fk^2/Dk=beta^3/eta*epsilon	[2.86, 212.851]
epsilon/beta^2	[0.0534, 1.398]
k/beta	[0.00119, 0.0563]
k^2/epsilon	[2.97e-06, 0.00831]
eta/xc	[0.0225, 0.117]
beta/xc	[0.0895, 1.328]
epsilon/xc^2	[0.0131, 0.114]
k/xc	[0.000318, 0.0201]
best fit no ext hazard_MedianLifetime	[10.49, 11.49]
best fit no ext hazard_MaxLifetime	[18.63, 18.63]
best fit_MedianLifetime	[10.26, 11.26]
best fit_MaxLifetime	[18.02, 18.02]
data_MedianLifetime	[10.26, 11.26]
data_MaxLifetime	[19.0, 19.0]
ML_lnprob	[-8450.4844673953, -8450.4844673953]

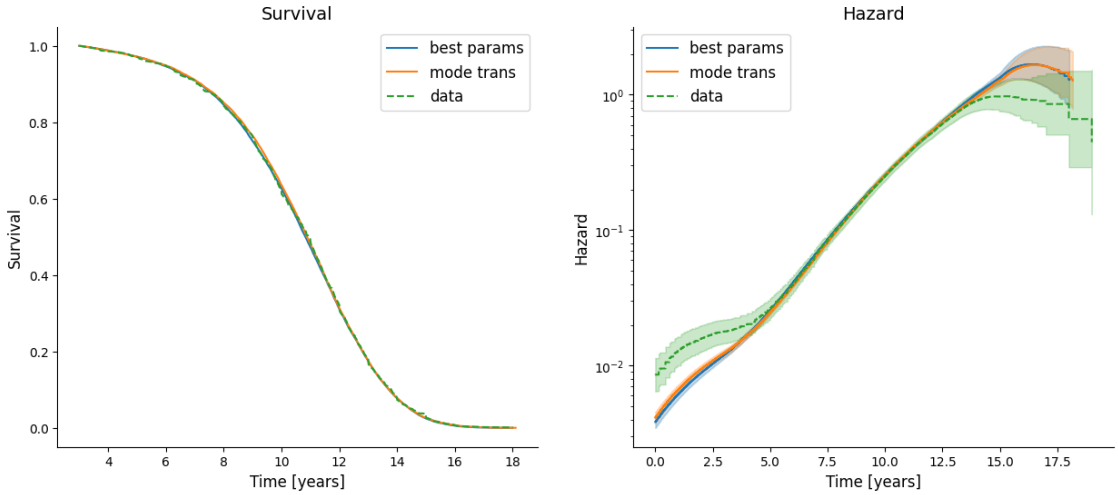
	max_likelihood	mode_overall
xc/eta	8.426	9.256
beta/eta	10.237	9.919
xc^2/epsilon	8.436	9.752
xc	299.931	195.835
ExtH	4.906	4.956
eta	35.595	10.078
beta	364.389	81.638
epsilon	10663.918	1195.237
sqrt(xc/eta)	2.903	2.903
s= eta^0.5*xc^1.5/epsilon	2.906	2.906
beta*xc/epsilon	10.249	10.249
eta*xc/epsilon	1.001	1.001
Fx=beta^2/eta*xc	12.437	12.437
Dx =beta*epsilon/eta*xc^2	1.214	1.214
Pk=beta*k/epsilon	0.0171	0.0342
Fk=beta^2/eta*k	7460.591	1322.704
Dk =beta*epsilon/eta*k^2	436671.727	113355.974
Fk^2/Dk=beta^3/eta*epsilon	127.465	58.799
epsilon/beta^2	0.0803	0.0803
k/beta	0.00137	0.00137
k^2/epsilon	0.000023	0.000023
eta/xc	0.119	0.108
beta/xc	1.215	1.072
epsilon/xc^2	0.119	0.103
k/xc	0.00167	0.00255

best fit no ext hazard_MedianLifetime	10.98	NaN
best fit no ext hazard_MaxLifetime	18.63	NaN
best fit_MedianLifetime	10.75	NaN
best fit_MaxLifetime	18.02	NaN
data_MedianLifetime	10.73	NaN
data_MaxLifetime	19.0	NaN
ML_lnprob	-8450.484467	-8450.484467

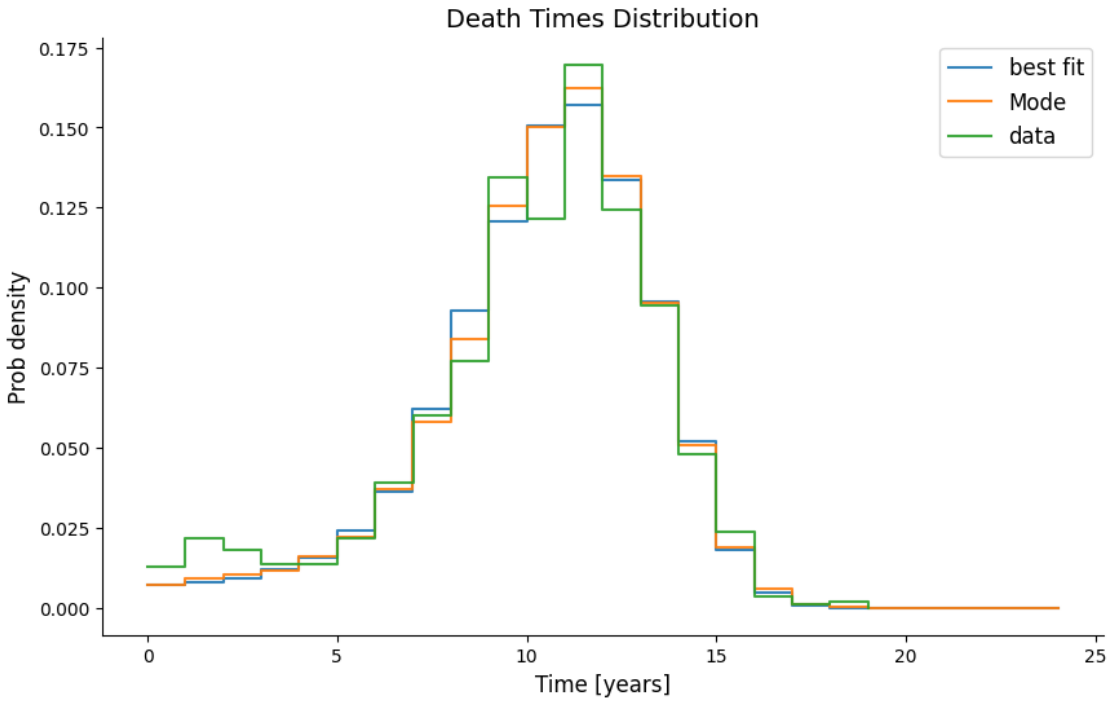
5 5. Fits of simulations to data

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')
```


Death Times Distribution
best fit
Mode
data
Prob density
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
0
5
10
15
20
25
Time [years]