mcmc_analysis_yeast_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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(16,)
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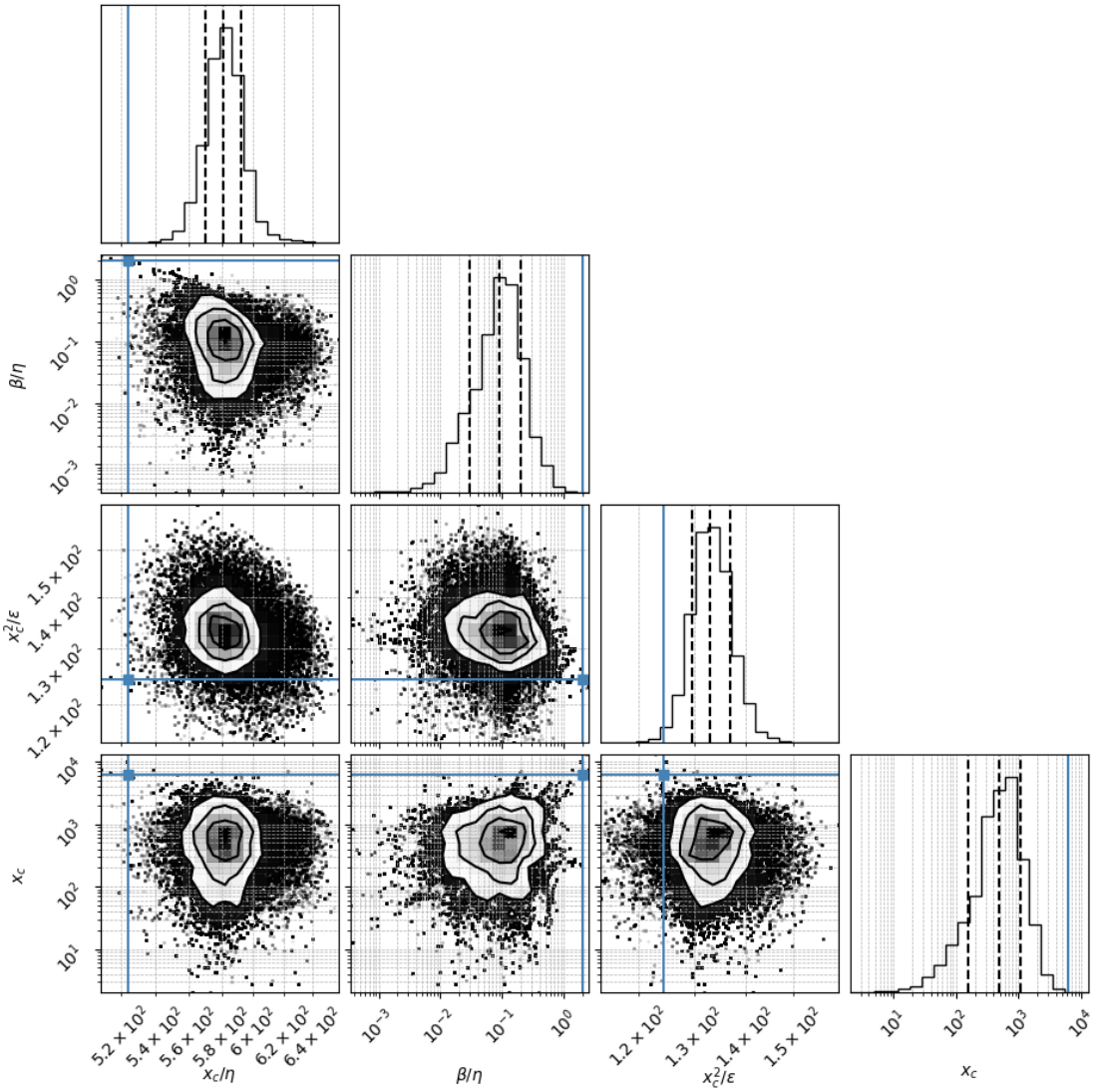
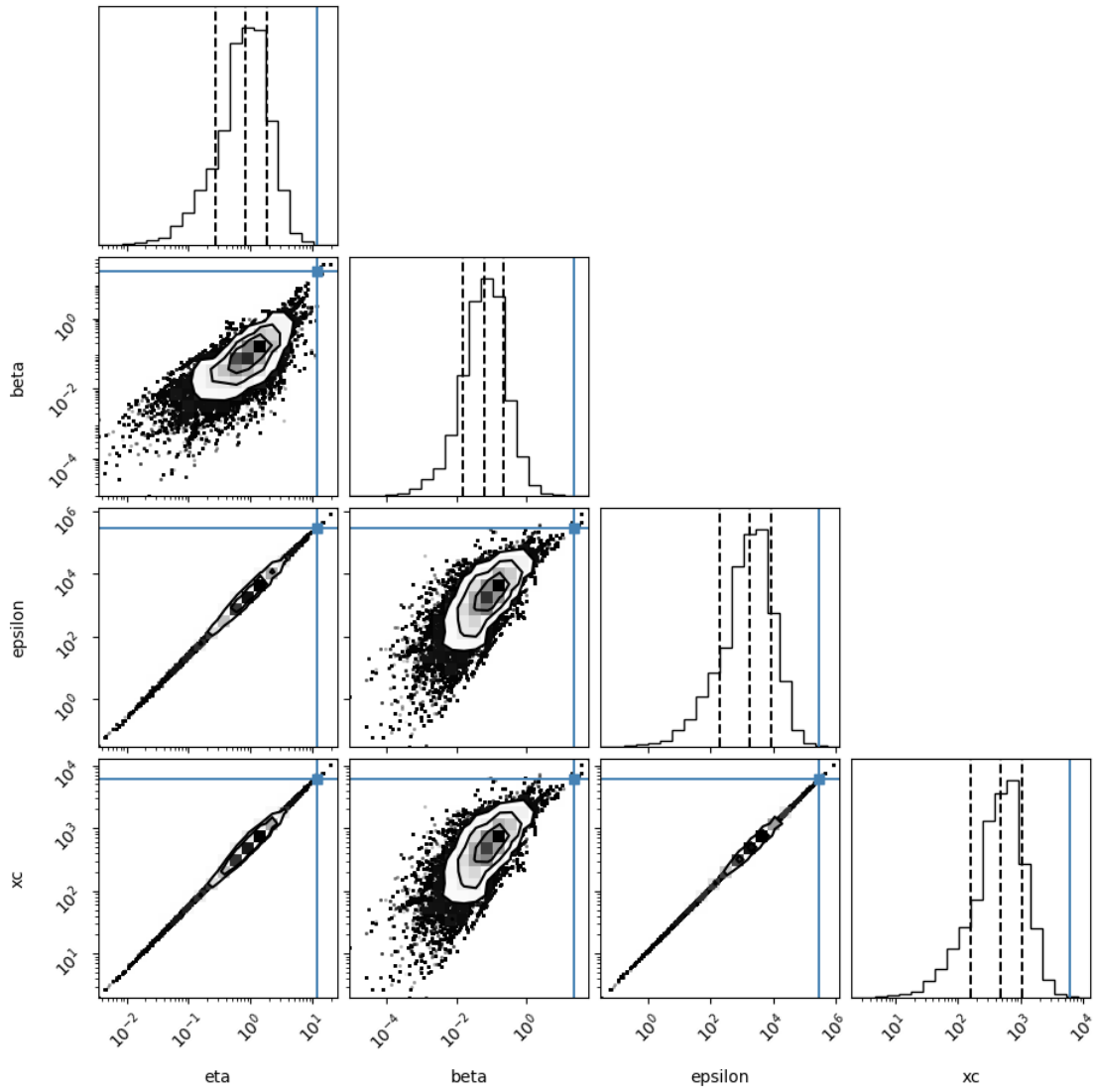
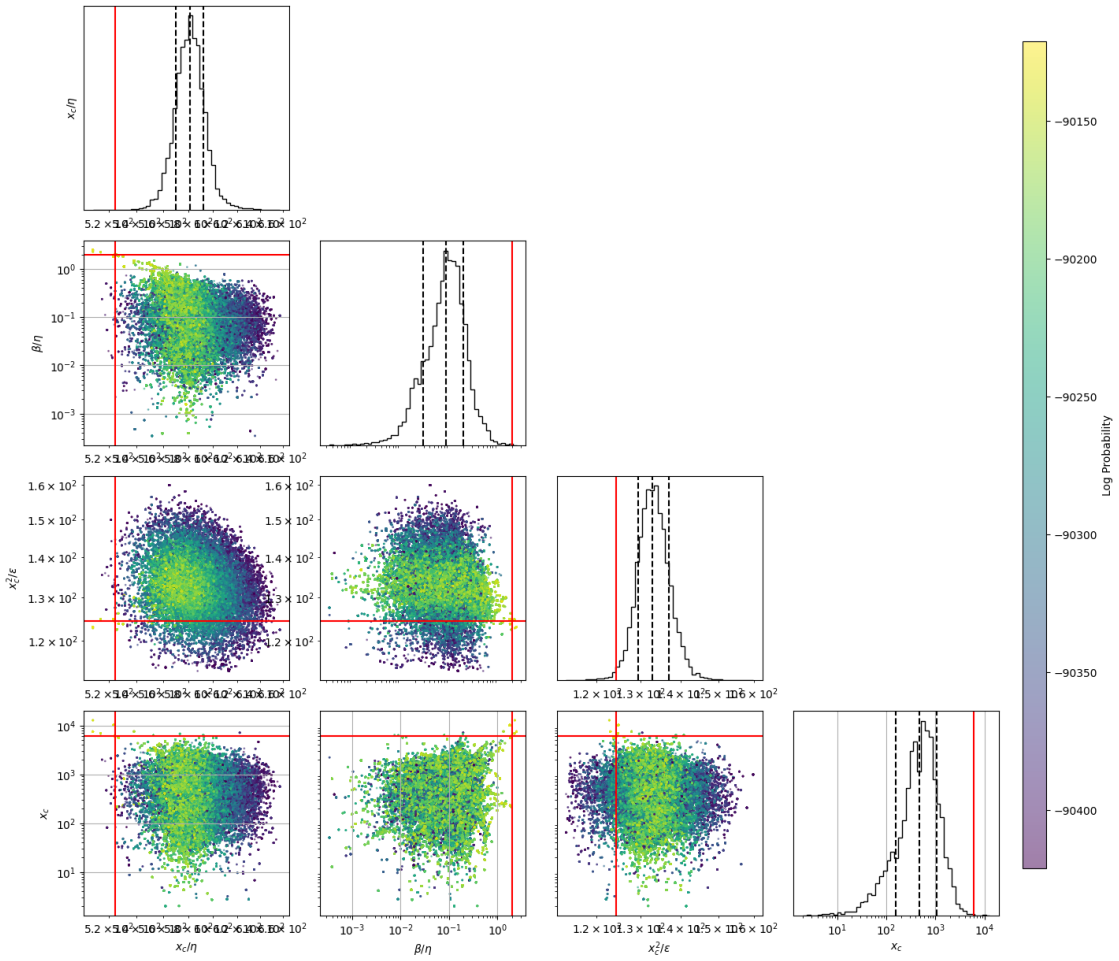

x_c/η
β/η
x_c^2/ε
x_c



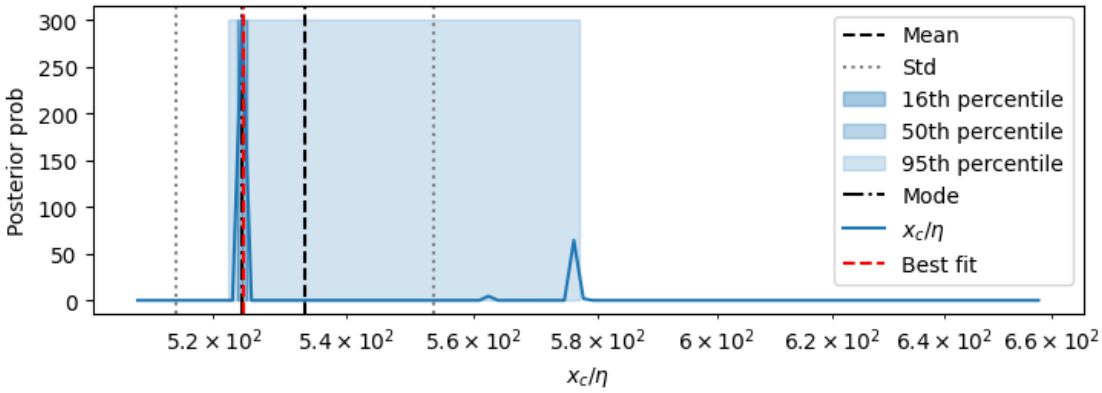
2 2. Heat map corner plot of raw samples

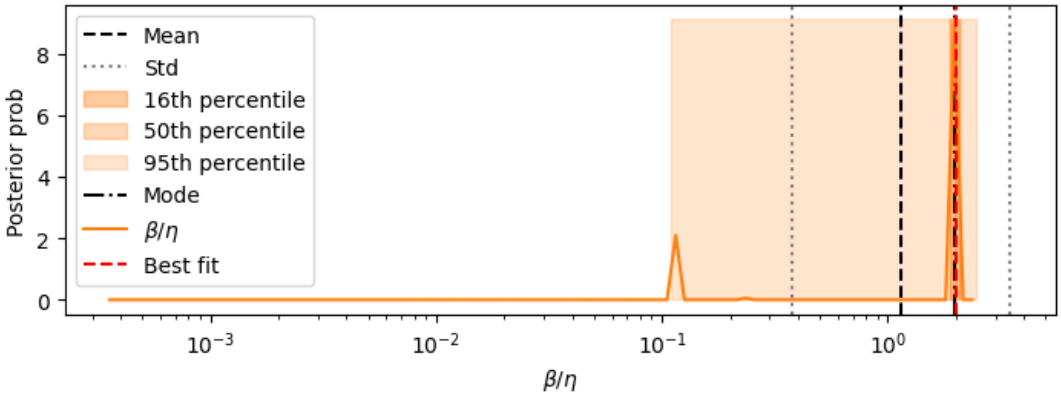
This plot shows all the raw sample points and their lnprobability

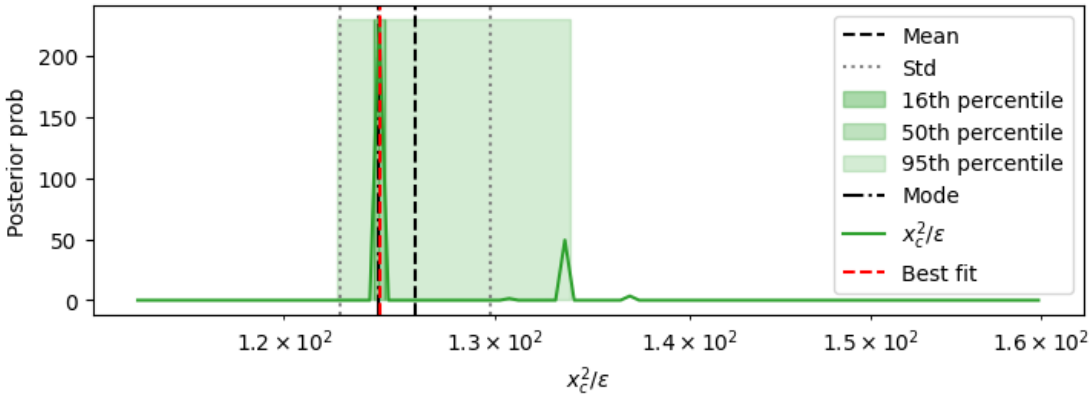


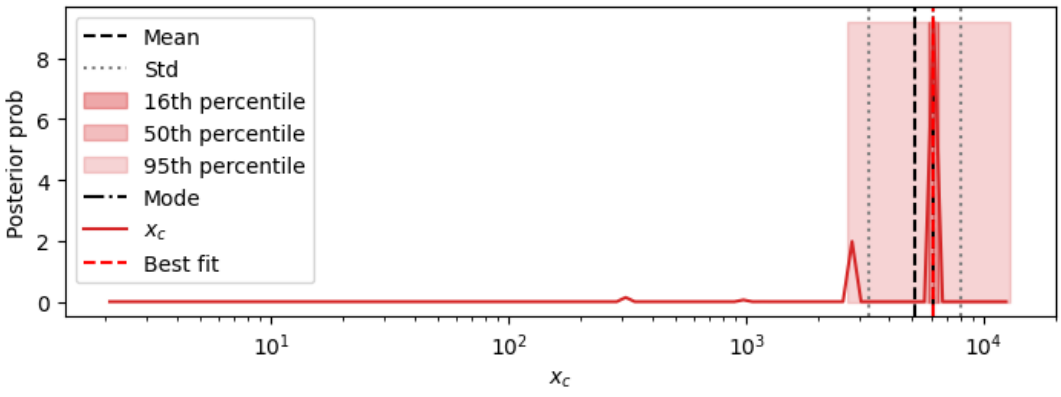
3 3. Posterior distributions of parameters

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


Posterior prob
300
250
200
150
100
50
0
Mean
Std
16th percentile
50th percentile
95th percentile
Mode
x_c/η
Best fit
5.2×10^2
5.4×10^2
5.6×10^2
5.8×10^2
6×10^2
6.2×10^2
6.4×10^2
6.6×10^2
x_c/η

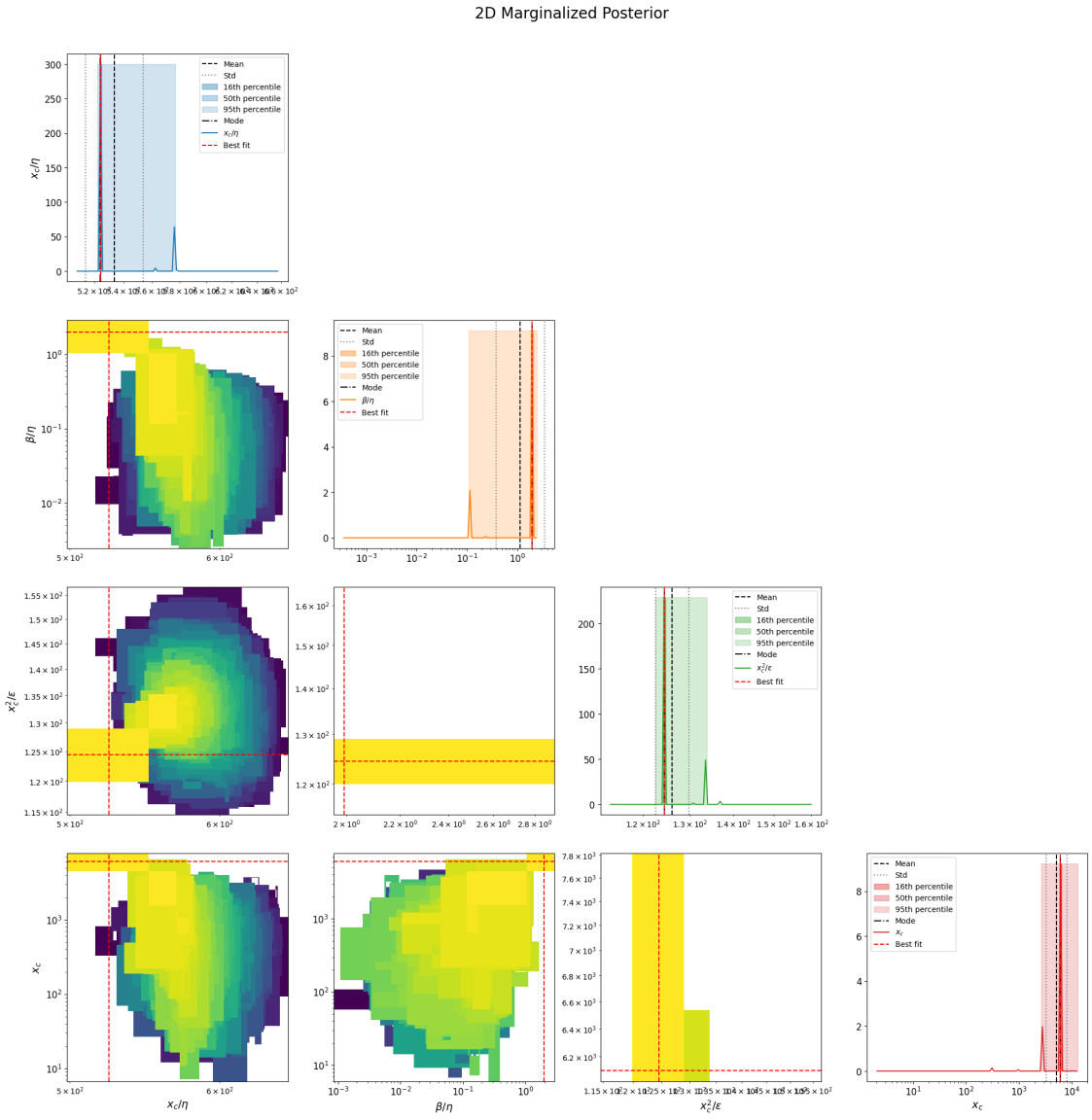

Posterior prob
8
6
4
2
0
Mean
Std
16th percentile
50th percentile
95th percentile
Mode
β/η
Best fit
10^{-3}
10^{-2}
10^{-1}
10^{0}
β/η


Posterior prob
200
150
100
50
0
Mean
Std
16th percentile
50th percentile
95th percentile
Mode
x_c^2/ε
Best fit
1.2×10^2
1.3×10^2
1.4×10^2
1.5×10^2
1.6×10^2
x_c^2/ε


Posterior prob
8
6
4
2
0
Mean
Std
16th percentile
50th percentile
95th percentile
Mode
x_c
Best fit
10^1
10^2
10^3
10^4
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 0.125
```

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	533.642	
beta/eta	1.15	
xc^2/epsilon	126.142	
xc	5111.219	
eta	11.88	
beta	24.219	
epsilon	301795.979	
sqrt(xc/eta)	23.101	
s= eta^0.5*xc^1.5/epsilon	5.463	
beta*xc/epsilon	0.274	
eta*xc/epsilon	0.236	
Fx=beta^2/eta*xc	0.00255	
Dx =beta*epsilon/eta*xc^2	0.00918	
Pk=beta*k/epsilon	0.00004	
Fk=beta^2/eta*k	87.127	
Dk =beta*epsilon/eta*k^2	2262925.654	
Fk^2/Dk=beta^3/eta*epsilon	0.00361	
epsilon/beta^2	544.678	
k/beta	0.0206	
k^2/epsilon	0.000001	
eta/xc	0.00187	
beta/xc	0.00222	
epsilon/xc^2	0.00793	
k/xc	0.000098	
best fit no ext hazard_MedianLifetime	25.43	
best fit no ext hazard_MaxLifetime	67.62	
best fit_MedianLifetime	25.3	
best fit_MaxLifetime	62.21	
data_MedianLifetime	26.0	
data_MaxLifetime	63.0	
ML_lnprob	-90121.128942	

	std	\
xc/eta	[19.164, 19.877]	
beta/eta	[0.771, 2.343]	
xc^2/epsilon	[3.52, 3.621]	
xc	[1849.289, 2897.708]	
eta	[0.115, 0.116]	
beta	[0.573, 0.587]	
epsilon	[5754.189, 5866.033]	

sqrt(xc/eta)	[0.419, 0.426]
s= eta^0.5*xc^1.5/epsilon	[0.0589, 0.0596]
beta*xc/epsilon	[0.186, 0.577]
eta*xc/epsilon	[0.00232, 0.00234]
Fx=beta^2/eta*xc	[0.00229, 0.0217]
Dx =beta*epsilon/eta*xc^2	[0.00628, 0.0199]
Pk=beta*k/epsilon	[6.36e-07, 6.46e-07]
Fk=beta^2/eta*k	[5.733, 6.137]
Dk =beta*epsilon/eta*k^2	[115109.035, 121278.132]
Fk^2/Dk=beta^3/eta*epsilon	[0.000199, 0.00021]
epsilon/beta^2	[14.695, 15.103]
k/beta	[0.000547, 0.000562]
k^2/epsilon	[2.11e-08, 2.17e-08]
eta/xc	[6.73e-05, 6.98e-05]
beta/xc	[0.00151, 0.00475]
epsilon/xc^2	[0.000221, 0.000228]
k/xc	[3.54e-05, 5.54e-05]
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	0.49
data_MaxLifetime	0
ML_lnprob	[-90121.12894204134, -90121.12894204134]

	mode \
xc/eta	524.268
beta/eta	1.972
xc^2/epsilon	124.43
xc	6139.051
eta	11.88
beta	24.221
epsilon	301813.072
sqrt(xc/eta)	22.897
s= eta^0.5*xc^1.5/epsilon	5.436
beta*xc/epsilon	0.474
eta*xc/epsilon	0.237
Fx=beta^2/eta*xc	0.00762
Dx =beta*epsilon/eta*xc^2	0.0161
Pk=beta*k/epsilon	0.00004
Fk=beta^2/eta*k	87.172
Dk =beta*epsilon/eta*k^2	2263741.357
Fk^2/Dk=beta^3/eta*epsilon	0.00361
epsilon/beta^2	544.583
k/beta	0.0206
k^2/epsilon	0.000001
eta/xc	0.00191

beta/xc	0.00387
epsilon/xc^2	0.00804
k/xc	0.000081
best fit no ext hazard_MedianLifetime	25.43
best fit no ext hazard_MaxLifetime	67.62
best fit_MedianLifetime	25.3
best fit_MaxLifetime	62.21
data_MedianLifetime	26.0
data_MaxLifetime	63.0
ML_lnprob	-90121.128942

	percentile_16
\	
xc/eta	[523.562, 524.975]
beta/eta	[1.886, 2.061]
xc^2/epsilon	[124.211, 124.649]
xc	[5875.498, 6414.426]
eta	[11.364, 12.42]
beta	[22.393, 26.198]
epsilon	[276264.137, 329724.775]
sqrt(xc/eta)	[22.881, 22.912]
s= eta^0.5*xc^1.5/epsilon	[5.426, 5.447]
beta*xc/epsilon	[0.453, 0.496]
eta*xc/epsilon	[0.237, 0.238]
Fx=beta^2/eta*xc	[0.00696, 0.00834]
Dx =beta*epsilon/eta*xc^2	[0.0154, 0.0168]
Pk=beta*k/epsilon	[3.72e-05, 4.28e-05]
Fk=beta^2/eta*k	[77.17, 98.47]
Dk =beta*epsilon/eta*k^2	[2021626.313, 2534852.707]
Fk^2/Dk=beta^3/eta*epsilon	[0.00316, 0.00414]
epsilon/beta^2	[497.244, 596.43]
k/beta	[0.0191, 0.0223]
k^2/epsilon	[7.57e-07, 9.04e-07]
eta/xc	[0.0019, 0.00191]
beta/xc	[0.0037, 0.00405]
epsilon/xc^2	[0.00802, 0.00805]
k/xc	[7.79e-05, 8.51e-05]
best fit no ext hazard_MedianLifetime	[24.94, 25.94]
best fit no ext hazard_MaxLifetime	[67.62, 67.62]
best fit_MedianLifetime	[24.810000000000002, 25.810000000000002]
best fit_MaxLifetime	[62.21, 62.21]
data_MedianLifetime	[25.53, 26.49]
data_MaxLifetime	[63.0, 63.0]
ML_lnprob	[-90121.12894204134, -90121.12894204134]

	percentile_50
\	

```
xc/eta                                                    [523.562, 524.975]
beta/eta                                                      [1.886, 2.061]
xc^2/epsilon                                              [124.211, 124.649]
xc                                                       [5875.498, 6414.426]
eta                                                           [11.364, 12.42]
beta                                                      [22.393, 26.198]
epsilon                                                [276264.137, 329724.775]
sqrt(xc/eta)                                              [22.881, 22.912]
s= eta^0.5*xc^1.5/epsilon                                   [5.426, 5.447]
beta*xc/epsilon                                             [0.453, 0.496]
eta*xc/epsilon                                              [0.237, 0.238]
Fx=beta^2/eta*xc                                         [0.00696, 0.00834]
Dx =beta*epsilon/eta*xc^2                                   [0.0154, 0.0168]
Pk=beta*k/epsilon                                       [3.72e-05, 4.28e-05]
Fk=beta^2/eta*k                                               [77.17, 98.47]
Dk =beta*epsilon/eta*k^2                             [2021626.313, 2534852.707]
Fk^2/Dk=beta^3/eta*epsilon                                [0.00316, 0.00414]
epsilon/beta^2                                             [497.244, 596.43]
k/beta                                                      [0.0191, 0.0223]
k^2/epsilon                                             [7.57e-07, 9.04e-07]
eta/xc                                                     [0.0019, 0.00191]
beta/xc                                                    [0.0037, 0.00405]
epsilon/xc^2                                               [0.00802, 0.00805]
k/xc                                                    [7.79e-05, 8.51e-05]
best fit no ext hazard_MedianLifetime                         [24.94, 25.94]
best fit no ext hazard_MaxLifetime                            [67.62, 67.62]
best fit_MedianLifetime               [24.810000000000002, 25.810000000000002]
best fit_MaxLifetime                                          [62.21, 62.21]
data_MedianLifetime                                           [25.53, 26.49]
data_MaxLifetime                                                [63.0, 63.0]
ML_lnprob                             [-90121.12894204134, -90121.12894204134]

                                                                 percentile_95
\
xc/eta                                                    [522.154, 576.885]
beta/eta                                                        [0.11, 2.462]
xc^2/epsilon                                              [122.471, 133.76]
xc                                                       [2667.026, 12943.813]
eta                                                           [11.364, 12.42]
beta                                                      [22.393, 26.198]
epsilon                                                [276264.137, 329724.775]
sqrt(xc/eta)                                              [22.851, 24.018]
s= eta^0.5*xc^1.5/epsilon                                   [5.405, 5.575]
beta*xc/epsilon                                            [0.0248, 0.595]
eta*xc/epsilon                                               [0.231, 0.24]
Fx=beta^2/eta*xc                                        [2.21e-05, 0.0119]
Dx =beta*epsilon/eta*xc^2                                 [0.000808, 0.0201]
```

Pk=beta*k/epsilon	[3.72e-05, 4.28e-05]
Fk=beta^2/eta*k	[77.17, 98.47]
Dk =beta*epsilon/eta*k^2	[2021626.313, 2534852.707]
Fk^2/Dk=beta^3/eta*epsilon	[0.00316, 0.00414]
epsilon/beta^2	[497.244, 596.43]
k/beta	[0.0191, 0.0223]
k^2/epsilon	[7.57e-07, 9.04e-07]
eta/xc	[0.00173, 0.00192]
beta/xc	[0.0002, 0.00486]
epsilon/xc^2	[0.00748, 0.00817]
k/xc	[3.86e-05, 0.000187]
best fit no ext hazard_MedianLifetime	[24.94, 25.94]
best fit no ext hazard_MaxLifetime	[67.62, 67.62]
best fit_MedianLifetime	[24.810000000000002, 25.810000000000002]
best fit_MaxLifetime	[62.21, 62.21]
data_MedianLifetime	[25.53, 26.49]
data_MaxLifetime	[63.0, 63.0]
ML_lnprob	[-90121.12894204134, -90121.12894204134]

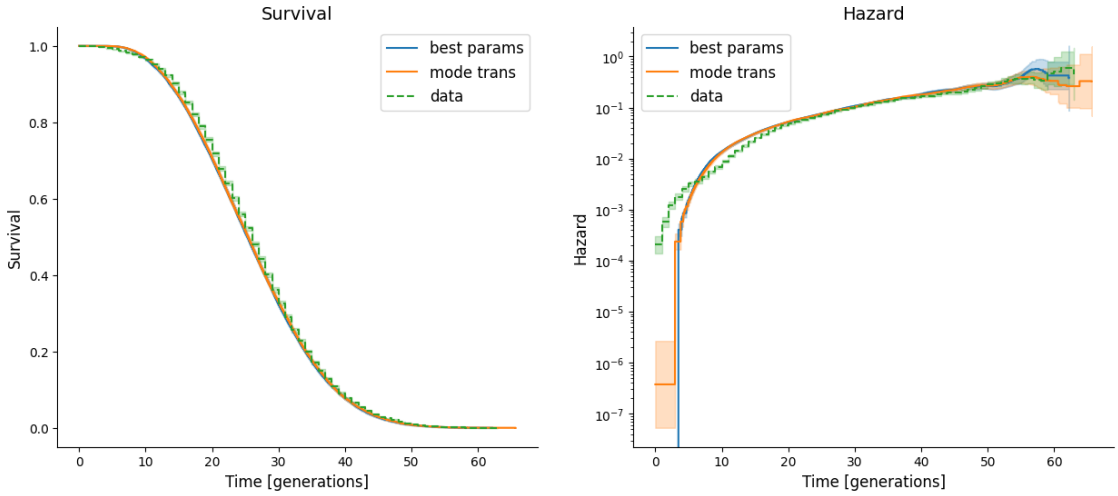
	max_likelihood	mode_overall
xc/eta	524.419	524.419
beta/eta	1.992	1.992
xc^2/epsilon	124.443	124.443
xc	6101.382	6101.382
eta	11.635	11.635
beta	23.176	23.176
epsilon	299146.881	299146.881
sqrt(xc/eta)	22.9	22.9
s= eta^0.5*xc^1.5/epsilon	5.434	5.434
beta*xc/epsilon	0.473	0.473
eta*xc/epsilon	0.237	0.237
Fx=beta^2/eta*xc	0.00757	0.00757
Dx =beta*epsilon/eta*xc^2	0.016	0.016
Pk=beta*k/epsilon	0.000039	0.000039
Fk=beta^2/eta*k	92.333	92.333
Dk =beta*epsilon/eta*k^2	2383594.005	2383594.005
Fk^2/Dk=beta^3/eta*epsilon	0.00358	0.00358
epsilon/beta^2	556.94	556.94
k/beta	0.0216	0.0216
k^2/epsilon	0.000001	0.000001
eta/xc	0.00191	0.00191
beta/xc	0.0038	0.0038
epsilon/xc^2	0.00804	0.00804
k/xc	0.000082	0.000082
best fit no ext hazard_MedianLifetime	25.43	NaN
best fit no ext hazard_MaxLifetime	67.62	NaN
best fit_MedianLifetime	25.3	NaN

best fit_MaxLifetime	62.21	NaN
data_MedianLifetime	26.0	NaN
data_MaxLifetime	63.0	NaN
ML_lnprob	-90121.128942	-90121.128942

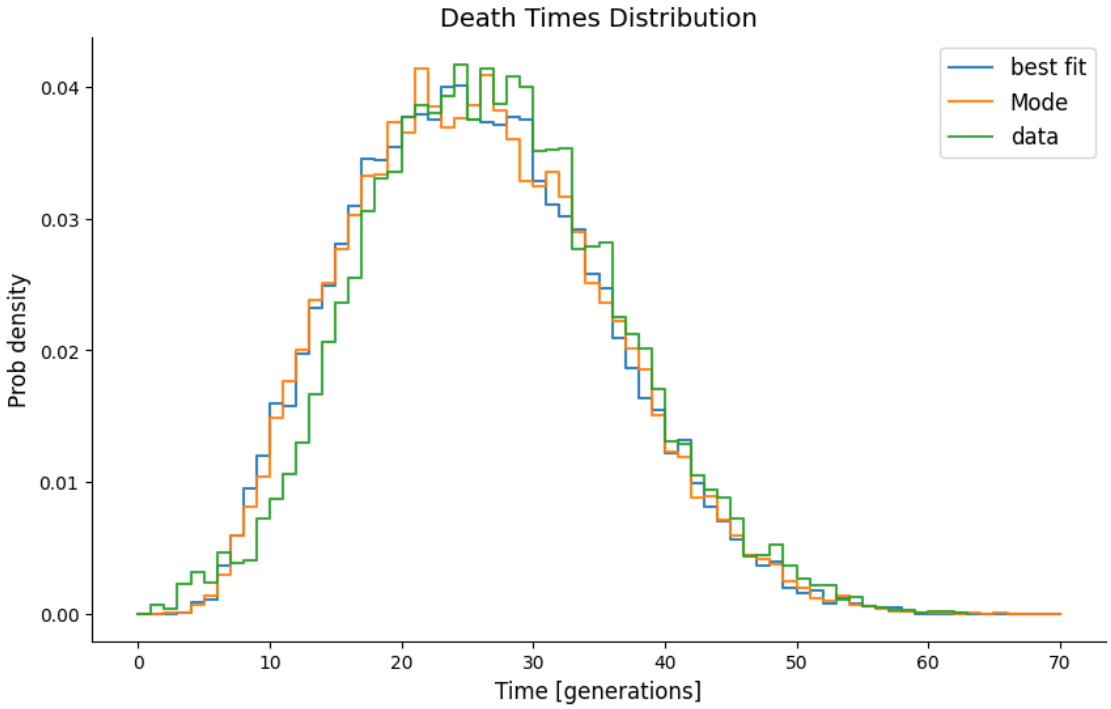
5 5. Fits of simulations to data

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
0.04
0.03
0.02
0.01
0.00
0
10
20
30
40
50
60
70
Time [generations]