# mcmc_analysis_drosophila_853_baysian

November 24, 2025
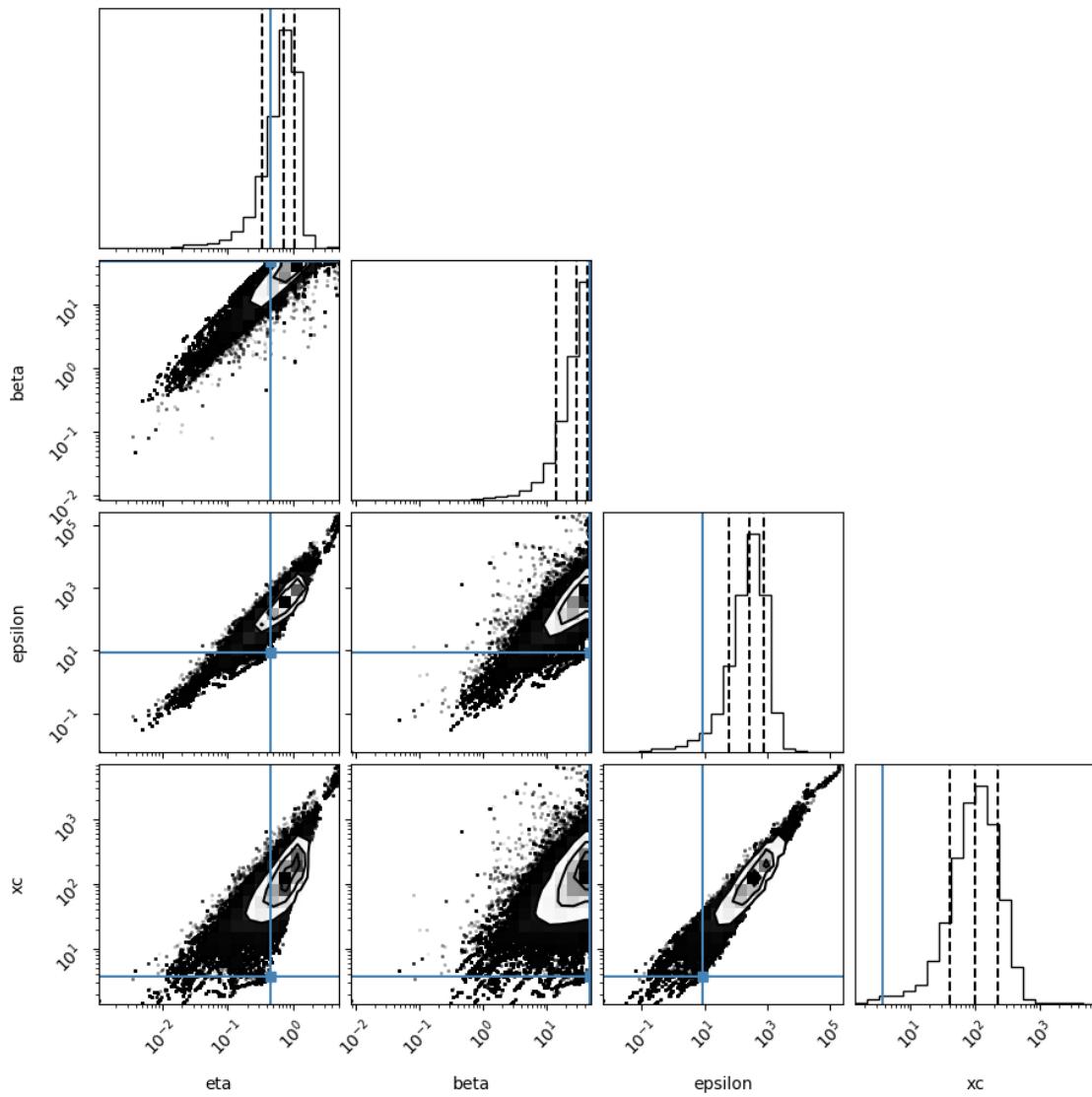
1   # 1. Density coner plot

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

```
(16,)
```
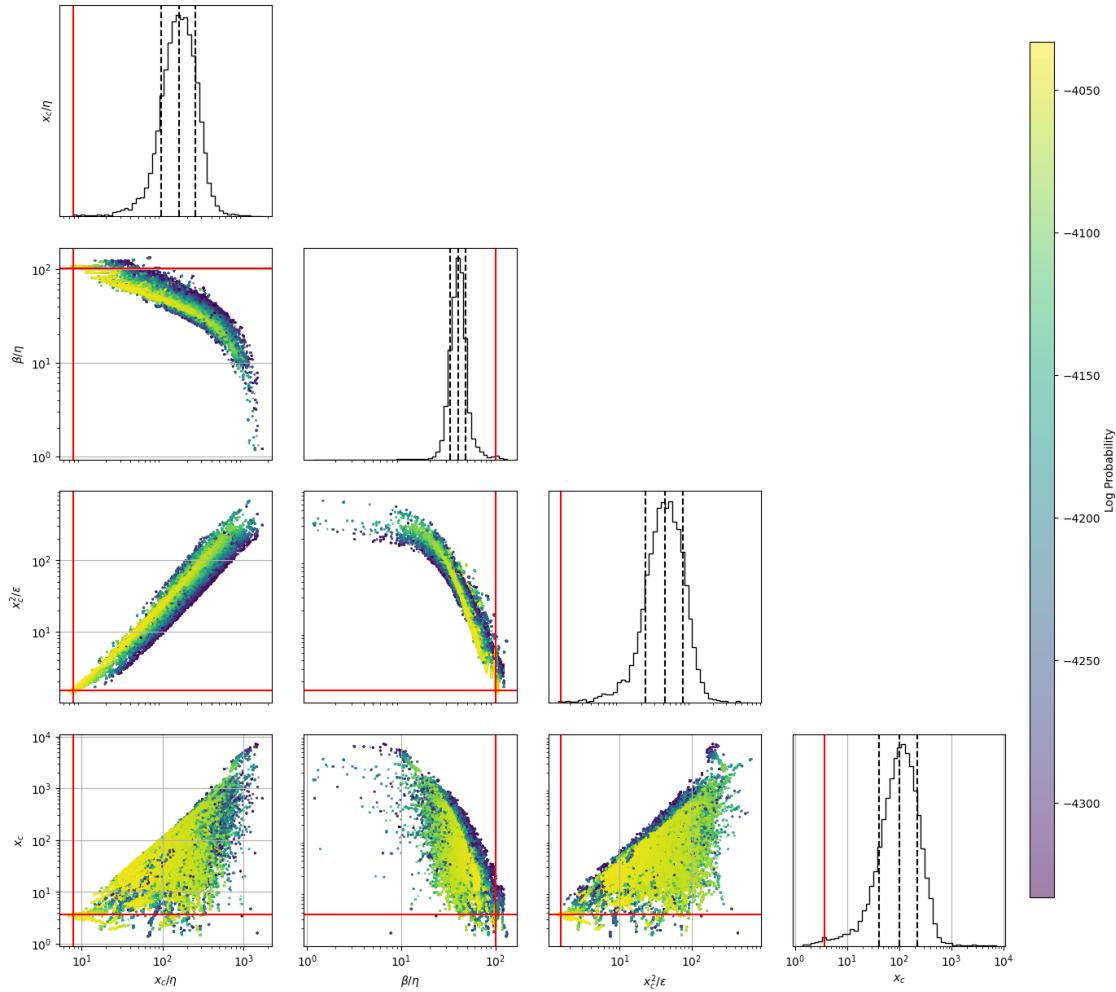
WARNING:root:Too few points to create valid contours
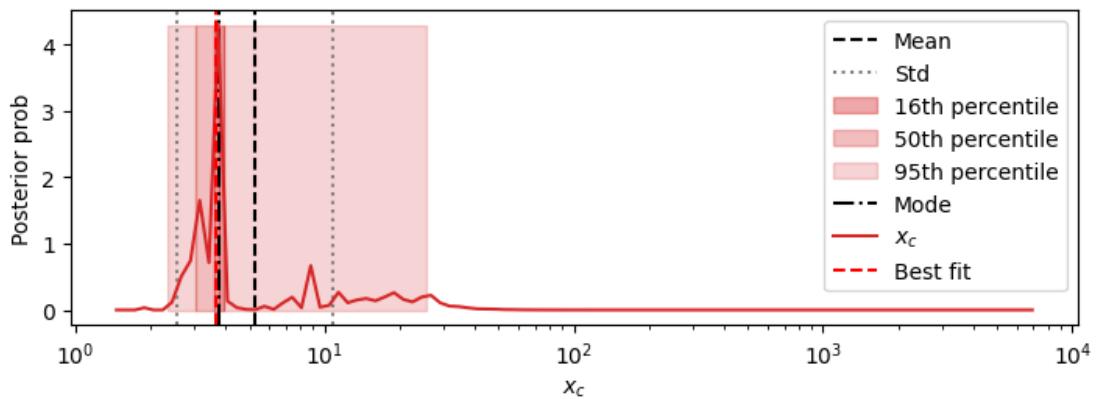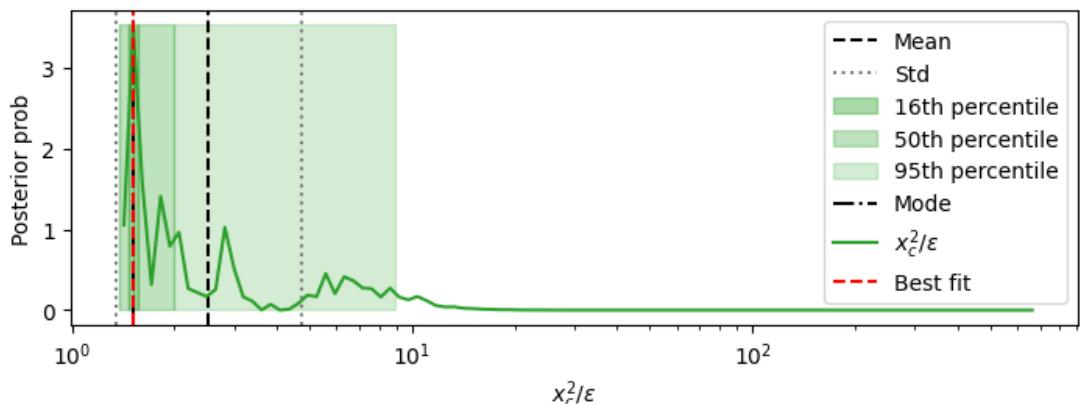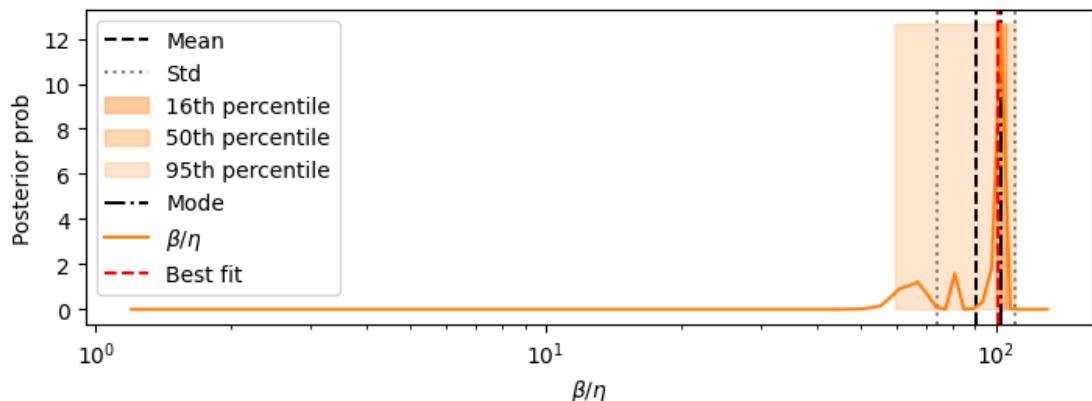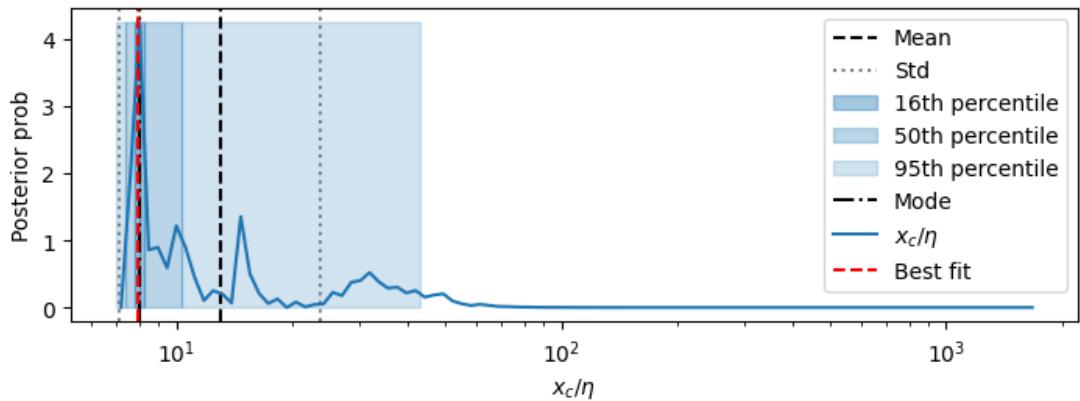
2 2. Heat map corner plot of raw samples

This plot shows all the raw sample points and their lnprobability
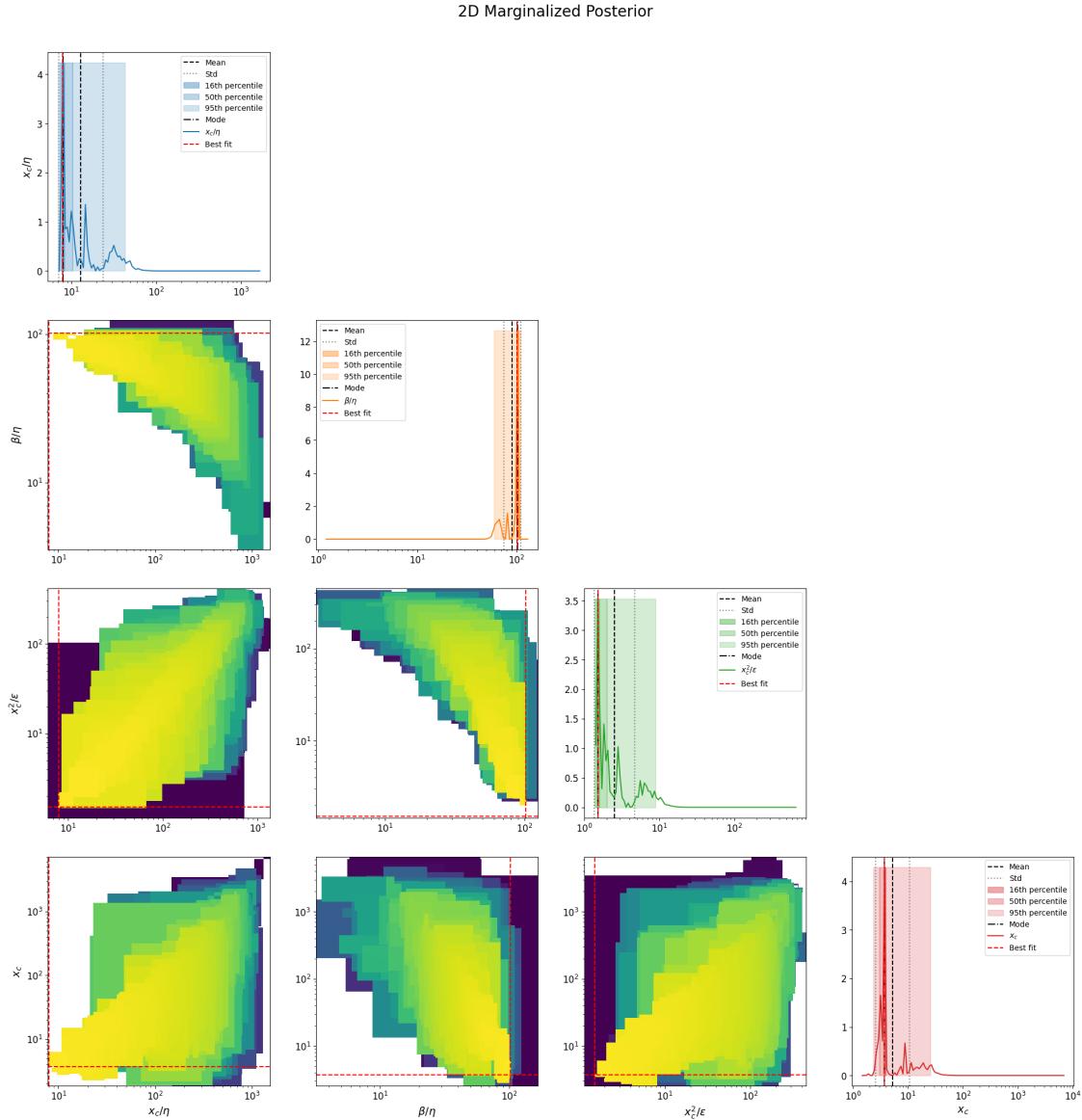
3 3. Posterior distributions of parameters

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

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)
```


2D Marginalized Posterior

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                                   12.982
beta/eta                                 90.368
xc^2/epsilon                              2.527
xc                                        5.229
eta                                       0.378
beta                                     33.729
epsilon                                   9.738
sqrt(xc/eta)                              3.676
s= eta^0.5*xc^1.5/epsilon                 0.716
beta*xc/epsilon                          17.28
eta*xc/epsilon                            0.196
Fx=beta^2/eta*xc                        506.197
Dx =beta*epsilon/eta*xc^2                29.934
Pk=beta*k/epsilon                         1.878
Fk=beta^2/eta*k                        6158.467
Dk =beta*epsilon/eta*k^2               3380.012
Fk^2/Dk=beta^3/eta*epsilon            11301.807
epsilon/beta^2                            0.0108
k/beta                                    0.0162
k^2/epsilon                               0.0243
eta/xc                                    0.0795
beta/xc                                   7.23
epsilon/xc^2                              0.409
k/xc                                      0.099
best fit no ext hazard_MedianLifetime    45.79
best fit no ext hazard_MaxLifetime       70.11
best fit_MedianLifetime                  45.77
best fit_MaxLifetime                     70.31
data_MedianLifetime                      47.0
data_MaxLifetime                         66.0
ML_lnprob                          -4032.985623

std  \
xc/eta                                          [5.851,
10.651]
beta/eta                                       [16.191,
19.725]
xc^2/epsilon                                    [1.173,
2.188]
xc                                              [2.681,
5.504]
```

7

```
eta                                              [0.124,
0.184]
beta                                             [10.23,
14.683]
epsilon                                          [6.105,
16.365]
sqrt(xc/eta)                                      [0.97,
1.317]
s= eta^0.5*xc^1.5/epsilon                        [0.202,
0.282]
beta*xc/epsilon                                  [2.743,
3.261]
eta*xc/epsilon                                 [0.00794,
0.00827]
Fx=beta^2/eta*xc                               [327.035,
923.993]
Dx =beta*epsilon/eta*xc^2                       [17.284,
40.898]
Pk=beta*k/epsilon                               [1.074,
2.509]
Fk=beta^2/eta*k                              [2195.696,
3412.289]
Dk =beta*epsilon/eta*k^2                     [1841.682,
4046.536]
Fk^2/Dk=beta^3/eta*epsilon                   [7548.221,
22727.209]
epsilon/beta^2                                 [0.00641,
0.0158]
k/beta                                          [0.0051,
0.00744]
k^2/epsilon                                     [0.0162,
0.048]
eta/xc                                          [0.0353,
0.0636]
beta/xc                                         [3.896,
8.448]
epsilon/xc^2                                     [0.187,
0.344]
k/xc                                            [0.0493,
0.0983]
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
0.54
data_MaxLifetime
0
ML_lnprob                                          [-4032.9856234774975,
-4032.9856234774975]


                                                    mode  \
xc/eta                                              8.02
beta/eta                                          102.777
xc^2/epsilon                                        1.516
xc                                                  3.741
eta                                                 0.418
beta                                               48.061
epsilon                                             8.745
sqrt(xc/eta)                                        2.832
s= eta^0.5*xc^1.5/epsilon                           0.536
beta*xc/epsilon                                    19.099
eta*xc/epsilon                                      0.196
Fx=beta^2/eta*xc                                  952.037
Dx =beta*epsilon/eta*xc^2                          66.255
Pk=beta*k/epsilon                                   2.682
Fk=beta^2/eta*k                                  9057.96
Dk =beta*epsilon/eta*k^2                         3617.977
Fk^2/Dk=beta^3/eta*epsilon                      24166.673
epsilon/beta^2                                      0.0053
k/beta                                              0.0135
k^2/epsilon                                         0.0406
eta/xc                                              0.125
beta/xc                                            12.685
epsilon/xc^2                                        0.66
k/xc                                                0.134
best fit no ext hazard_MedianLifetime              45.79
best fit no ext hazard_MaxLifetime                 70.11
best fit_MedianLifetime                            45.77
best fit_MaxLifetime                               70.31
data_MedianLifetime                                47.0
data_MaxLifetime                                   66.0
ML_lnprob                                       -4032.985623

percentile_16  \
xc/eta                                                             [7.803,
8.244]
beta/eta                                                          [100.373,
105.238]
xc^2/epsilon                                                       [1.47,
```

1.564]
xc	[3.584, 3.904]
eta	[0.401, 0.474]
beta	[46.017, 50.196]
epsilon	[6.714, 9.55]
sqrt(xc/eta)	[2.793, 2.871]
s= eta^0.5*xc^1.5/epsilon	[0.526, 0.546]
beta*xc/epsilon	[18.662, 19.546]
eta*xc/epsilon	[0.194, 0.198]
Fx=beta^2/eta*xc	[885.71, 1023.332]
Dx =beta*epsilon/eta*xc^2	[62.87, 69.823]
Pk=beta*k/epsilon	[2.526, 2.848]
Fk=beta^2/eta*k	[8555.008, 9590.48]
Dk =beta*epsilon/eta*k^2	[3314.634, 3949.08]
Fk^2/Dk=beta^3/eta*epsilon	[21979.211, 26571.841]
epsilon/beta^2	[0.00426, 0.0057]
k/beta	[0.0129, 0.0154]
k^2/epsilon	[0.0372, 0.0443]
eta/xc	[0.121, 0.128]
beta/xc	[12.069, 13.332]
epsilon/xc^2	[0.64, 0.68]
k/xc	[0.128, 0.14]
best fit no ext hazard_MedianLifetime	[45.3, 46.3]
best fit no ext hazard_MaxLifetime	[70.11, 70.11]

```
best fit_MedianLifetime                                      [45.28,
46.28]
best fit_MaxLifetime                                         [70.31,
70.31]
data_MedianLifetime                                          [46.52,
47.54]
data_MaxLifetime                                              [66.0,
66.0]
ML_lnprob                              [-4032.9856234774975,
-4032.9856234774975]

percentile_50  \
xc/eta                                                       [7.385,
10.276]
beta/eta                                                   [100.373,
105.238]
xc^2/epsilon                                                 [1.381,
2.004]
xc                                                           [3.021,
3.904]
eta                                                          [0.311,
0.516]
beta                                                        [35.454,
50.196]
epsilon                                                       [4.72,
9.55]
sqrt(xc/eta)                                                 [2.717,
3.206]
s= eta^0.5*xc^1.5/epsilon                                    [0.526,
0.638]
beta*xc/epsilon                                             [18.662,
20.473]
eta*xc/epsilon                                                [0.19,
0.198]
Fx=beta^2/eta*xc                                            [885.71,
1578.307]
Dx =beta*epsilon/eta*xc^2                                   [45.897,
69.823]
Pk=beta*k/epsilon                                            [2.526,
3.62]
Fk=beta^2/eta*k                                            [6072.404,
10751.282]
Dk =beta*epsilon/eta*k^2                                   [1959.993,
3949.08]
Fk^2/Dk=beta^3/eta*epsilon                               [18180.362,
32124.117]
epsilon/beta^2                                              [0.00368,
```

```
0.00881]
k/beta                                               [0.0118,
0.0183]
k^2/epsilon                                          [0.0261,
0.107]
eta/xc                                               [0.0973,
0.135]
beta/xc                                                 [9.89,
14.728]
epsilon/xc^2                                            [0.531,
0.724]
k/xc                                                   [0.128,
0.166]
best fit no ext hazard_MedianLifetime                   [45.3,
46.3]
best fit no ext hazard_MaxLifetime                     [70.11,
70.11]
best fit_MedianLifetime                                [45.28,
46.28]
best fit_MaxLifetime                                   [70.31,
70.31]
data_MedianLifetime                                    [46.52,
47.54]
data_MaxLifetime                                        [66.0,
66.0]
ML_lnprob                          [-4032.9856234774975,
-4032.9856234774975]

percentile_95  \
xc/eta                                                 [6.989,
43.01]
beta/eta                                              [59.638,
110.338]
xc^2/epsilon                                           [1.381,
8.891]
xc                                                     [2.338,
25.607]
eta                                                    [0.172,
0.857]
beta                                                  [16.215,
50.196]
epsilon                                                [2.333,
112.533]
sqrt(xc/eta)                                           [2.644,
6.741]
s= eta^0.5*xc^1.5/epsilon                              [0.506,
1.435]
```
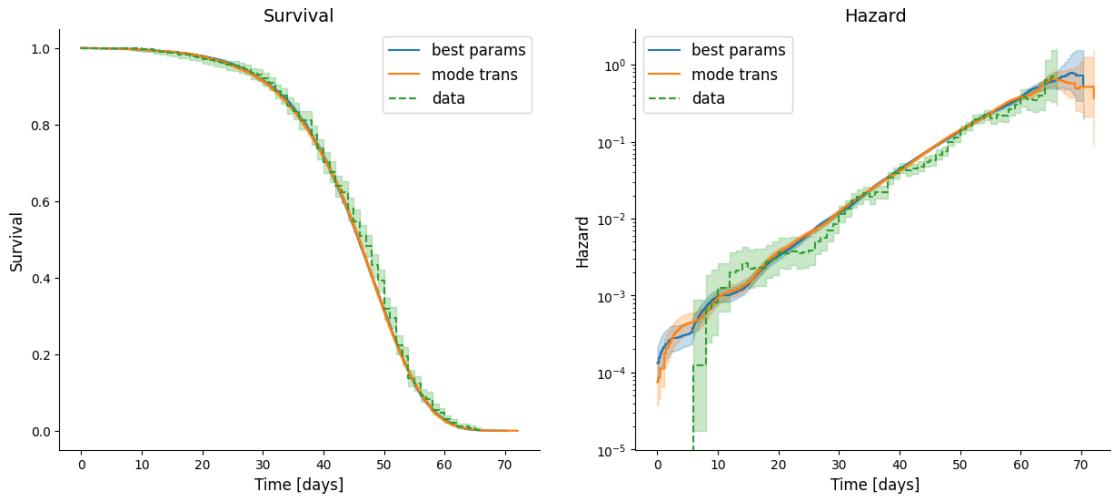
beta*xc/epsilon	[12.301, 21.443]
eta*xc/epsilon	[0.182, 0.219]
Fx=beta^2/eta*xc	[65.802, 1578.307]
Dx =beta*epsilon/eta*xc^2	[5.633, 77.545]
Pk=beta*k/epsilon	[0.258, 4.082]
Fk=beta^2/eta*k	[2434.453, 10751.282]
Dk =beta*epsilon/eta*k^2	[816.494, 32301.299]
Fk^2/Dk=beta^3/eta*epsilon	[1055.502, 32124.117]
epsilon/beta^2	[0.00368, 0.0583]
k/beta	[0.00995, 0.0367]
k^2/epsilon	[0.00186, 0.107]
eta/xc	[0.0233, 0.143]
beta/xc	[1.351, 14.728]
epsilon/xc^2	[0.112, 0.724]
k/xc	[0.0195, 0.214]
best fit no ext hazard_MedianLifetime	[45.3, 46.3]
best fit no ext hazard_MaxLifetime	[70.11, 70.11]
best fit_MedianLifetime	[45.28, 46.28]
best fit_MaxLifetime	[70.31, 70.31]
data_MedianLifetime	[46.52, 47.54]
data_MaxLifetime	[66.0, 66.0]
ML_lnprob	[-4032.9856234774975, -4032.9856234774975]

	max_likelihood	mode_overall
xc/eta	7.924	7.924

```
beta/eta                             101.488        101.488
xc^2/epsilon                           1.519          1.519
xc                                     3.678          3.678
eta                                    0.464          0.422
beta                                  47.102         42.756
epsilon                                8.906           7.76
sqrt(xc/eta)                           2.815          2.815
s= eta^0.5*xc^1.5/epsilon               0.54           0.54
beta*xc/epsilon                       19.452         19.452
eta*xc/epsilon                         0.192          0.192
Fx=beta^2/eta*xc                    1299.771       1299.771
Dx =beta*epsilon/eta*xc^2             66.821         66.821
Pk=beta*k/epsilon                      2.644          2.644
Fk=beta^2/eta*k                     9560.554       9560.554
Dk =beta*epsilon/eta*k^2            3615.289       3615.289
Fk^2/Dk=beta^3/eta*epsilon        25282.677      25282.677
epsilon/beta^2                       0.00401         0.0122
k/beta                                0.0106         0.0102
k^2/epsilon                           0.0281         0.0086
eta/xc                                 0.126          0.126
beta/xc                               12.807         12.807
epsilon/xc^2                           0.658          0.658
k/xc                                   0.136          0.136
best fit no ext hazard_MedianLifetime  45.79            NaN
best fit no ext hazard_MaxLifetime     70.11            NaN
best fit_MedianLifetime                45.77            NaN
best fit_MaxLifetime                   70.31            NaN
data_MedianLifetime                    47.0             NaN
data_MaxLifetime                       66.0             NaN
ML_lnprob                       -4032.985623   -4032.985623
```

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')