mcmc_analysis_drosophila_707_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

```
WARNING:root:Too few points to create valid contours
```

```
(16,)
```
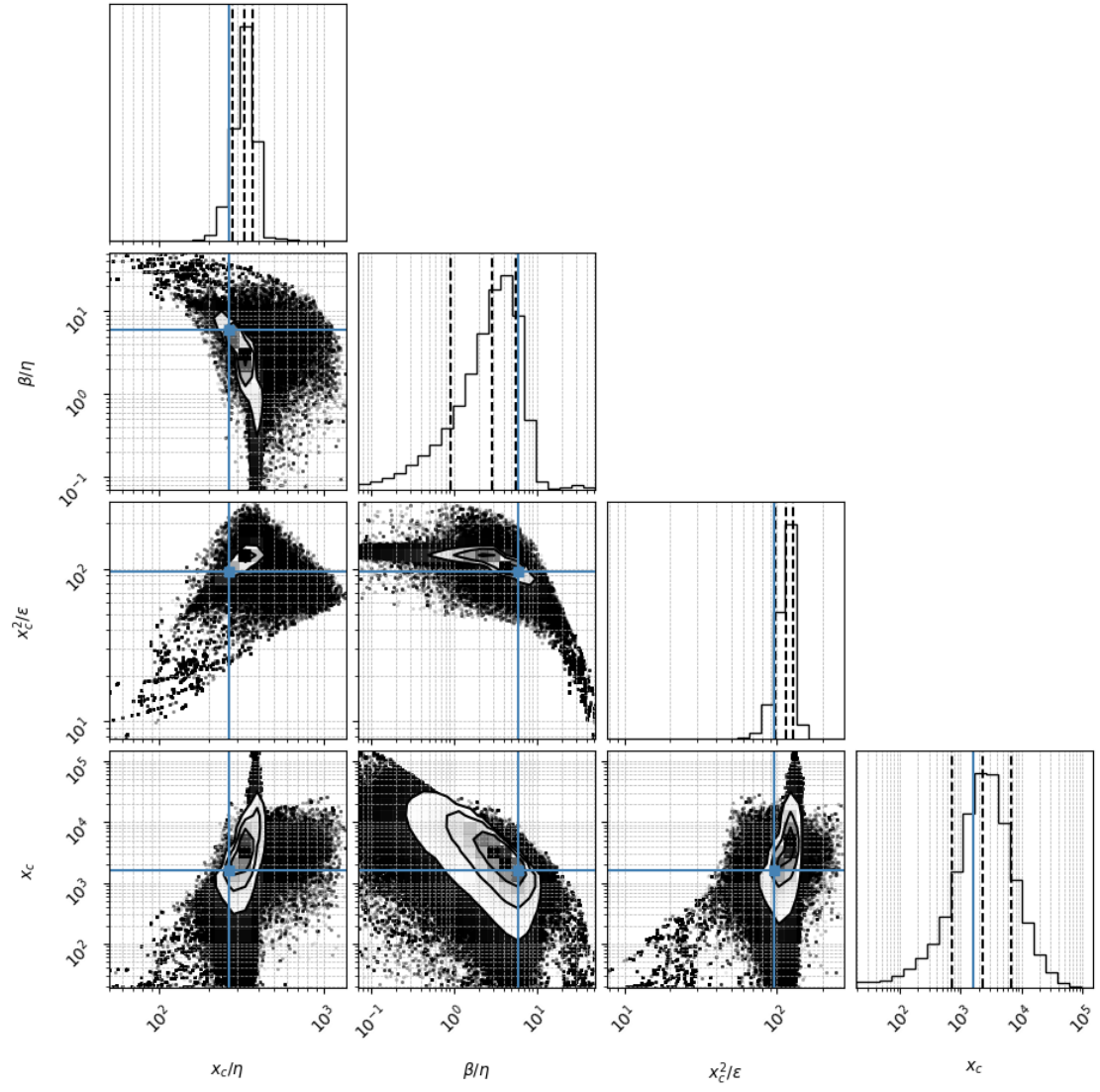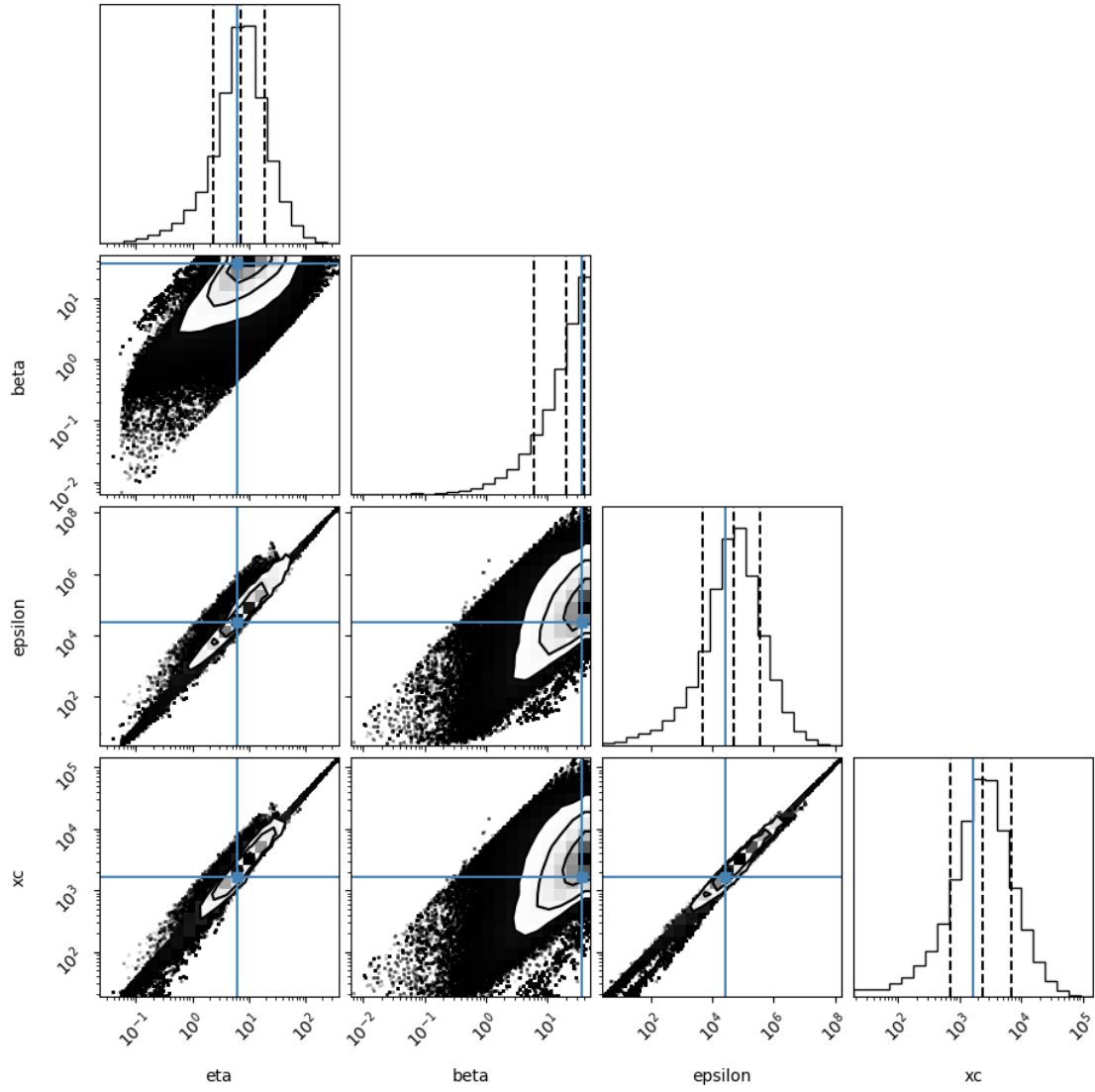
2   2. Heat map corner plot of raw samples

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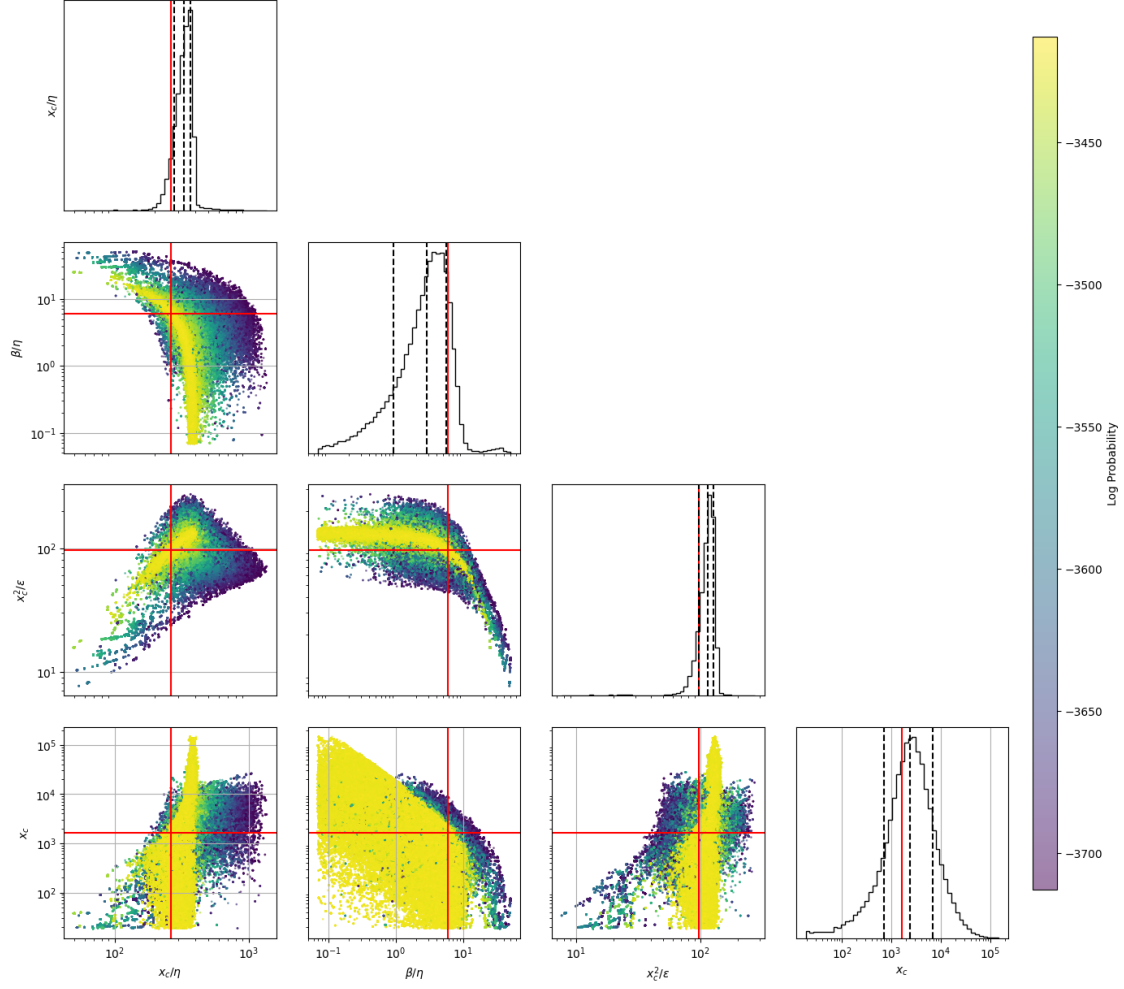
3 3. Posterior distributions of parameters

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

5
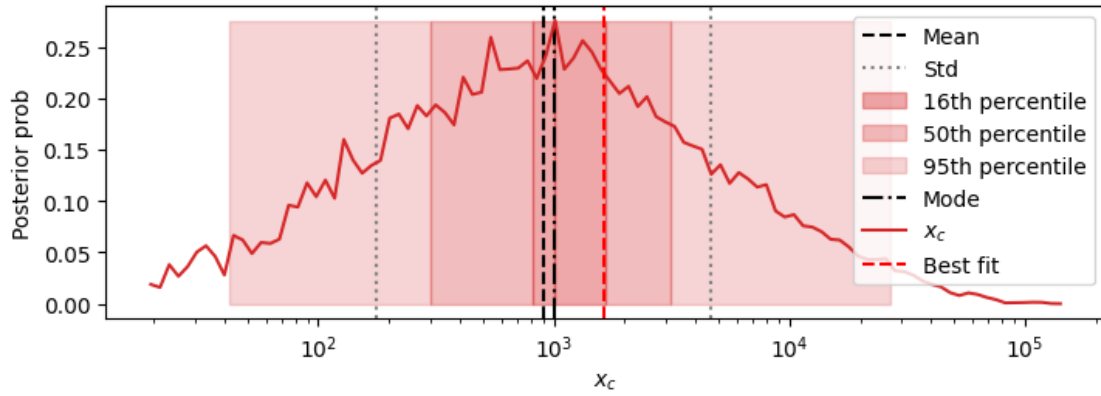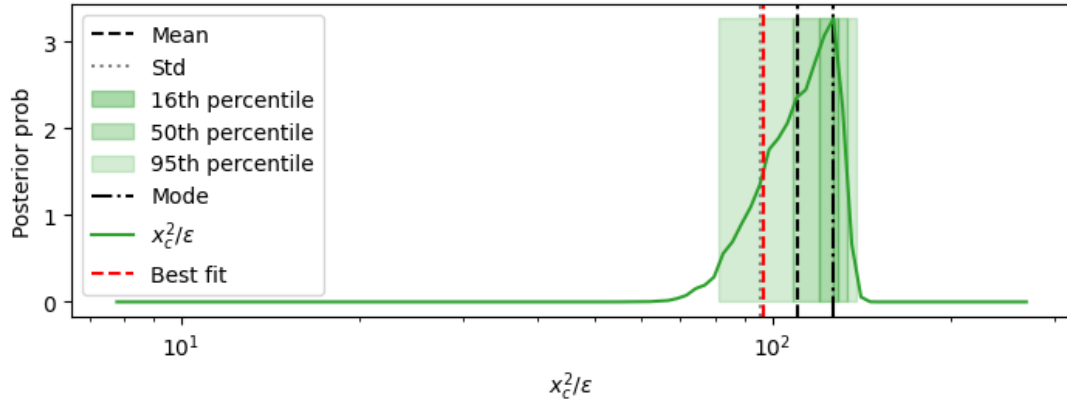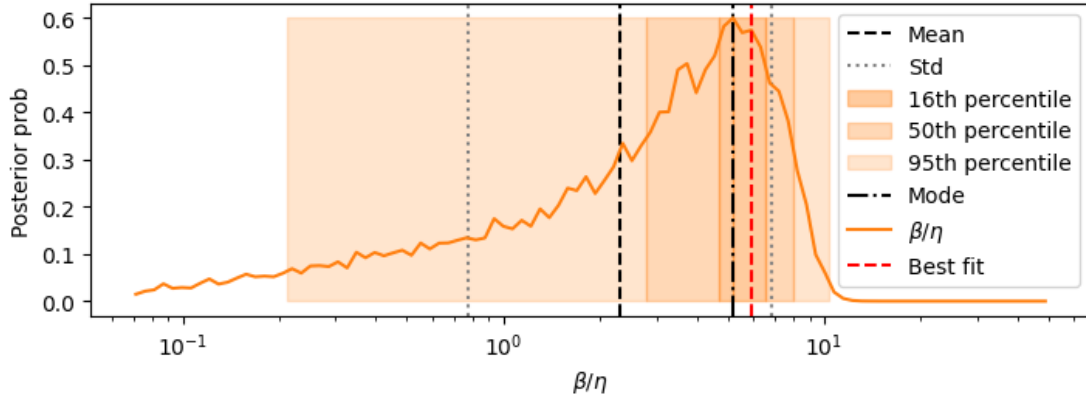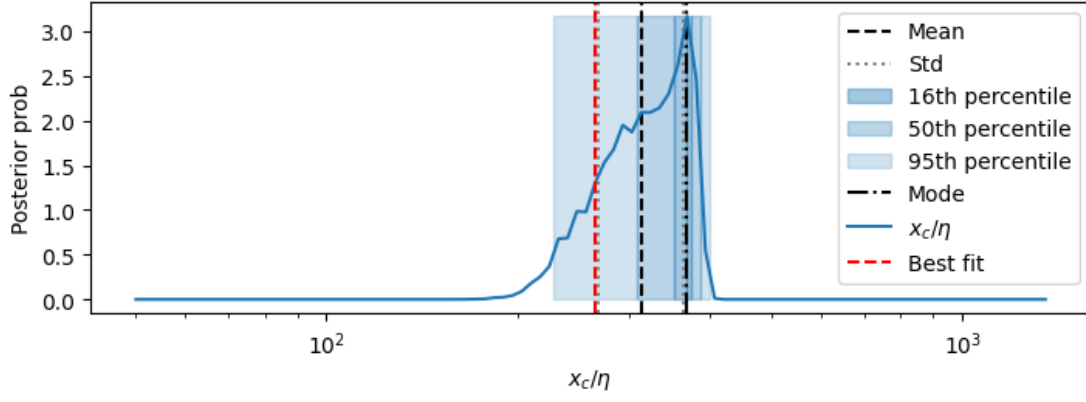
2D marginalizations of posterior distributions

```
/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
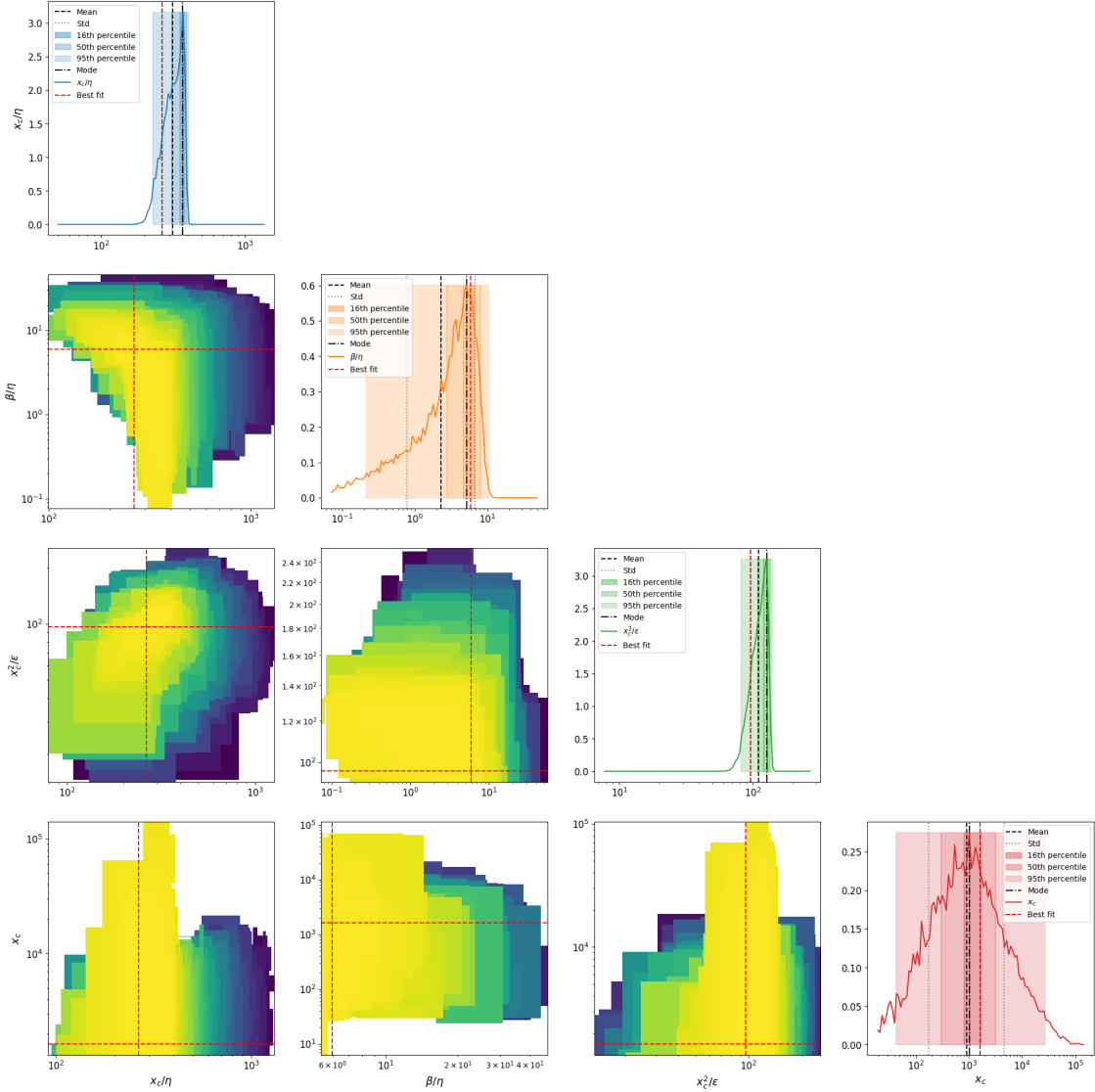
4   4. Table of results

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

```
                                                 mean   \
xc/eta                                         312.364
beta/eta                                         2.313
xc^2/epsilon                                   110.191
xc                                             901.822
eta                                              1.976
beta                                             4.033
epsilon                                       3442.114
sqrt(xc/eta)                                    17.654
s= eta^0.5*xc^1.5/epsilon                        6.225
beta*xc/epsilon                                  0.834
eta*xc/epsilon                                   0.353
Fx=beta^2/eta*xc                                0.0169
Dx =beta*epsilon/eta*xc^2                       0.0209
Pk=beta*k/epsilon                             0.000504
Fk=beta^2/eta*k                                 18.386
Dk =beta*epsilon/eta*k^2                     37528.481
Fk^2/Dk=beta^3/eta*epsilon                     0.00959
epsilon/beta^2                                 213.664
k/beta                                           0.134
k^2/epsilon                                   0.000084
eta/xc                                         0.00321
beta/xc                                        0.00746
epsilon/xc^2                                   0.00911
k/xc                                          0.000597
best fit no ext hazard_MedianLifetime           21.72
best fit no ext hazard_MaxLifetime              53.05
best fit_MedianLifetime                         21.82
best fit_MaxLifetime                            46.45
data_MedianLifetime                              22.0
data_MaxLifetime                                 47.0
ML_lnprob                                 -3412.844187


                                                   std
                                          \
xc/eta                                  [45.172, 52.809]
beta/eta                                  [1.533, 4.551]
xc^2/epsilon                            [14.573, 16.794]
xc                                     [725.507, 3710.847]
eta                                       [1.638, 9.584]
beta                                     [3.164, 14.677]
epsilon                              [3349.366, 124304.09]
```

```
sqrt(xc/eta)                                                    [1.32, 1.427]
s= eta^0.5*xc^1.5/epsilon                                       [0.429, 0.46]
beta*xc/epsilon                                                 [0.554, 1.648]
eta*xc/epsilon                                                  [0.0164, 0.0172]
Fx=beta^2/eta*xc                                                [0.0153, 0.162]
Dx =beta*epsilon/eta*xc^2                                       [0.0148, 0.0508]
Pk=beta*k/epsilon                                               [0.00047, 0.00716]
Fk=beta^2/eta*k                                                 [16.084, 128.419]
Dk =beta*epsilon/eta*k^2                                  [35639.429, 708023.88]
Fk^2/Dk=beta^3/eta*epsilon                                      [0.00936, 0.396]
epsilon/beta^2                                                  [198.746, 2846.572]
k/beta                                                          [0.104, 0.462]
k^2/epsilon                                                     [8.2e-05, 0.00309]
eta/xc                                                          [0.000472, 0.000554]
beta/xc                                                         [0.00532, 0.0186]
epsilon/xc^2                                                    [0.00123, 0.00142]
k/xc                                                            [0.000484, 0.00256]
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                                             0.56
data_MaxLifetime                                                0
ML_lnprob                          [-3412.844186794696, -3412.844186794696]


                                     mode  \
xc/eta                            369.203
beta/eta                            5.196
xc^2/epsilon                      126.992
xc                               1013.268
eta                                 3.824
beta                                5.073
epsilon                          7697.876
sqrt(xc/eta)                       19.215
s= eta^0.5*xc^1.5/epsilon           6.483
beta*xc/epsilon                     1.838
eta*xc/epsilon                      0.357
Fx=beta^2/eta*xc                    0.0894
Dx =beta*epsilon/eta*xc^2           0.0512
Pk=beta*k/epsilon                   0.0027
Fk=beta^2/eta*k                    50.718
Dk =beta*epsilon/eta*k^2       103302.36
Fk^2/Dk=beta^3/eta*epsilon          0.144
epsilon/beta^2                     29.538
k/beta                              0.0985
k^2/epsilon                         0.00008
eta/xc                              0.00271
```

```
beta/xc                                          0.0164
epsilon/xc^2                                     0.00787
k/xc                                             0.000493
best fit no ext hazard_MedianLifetime            21.72
best fit no ext hazard_MaxLifetime               53.05
best fit_MedianLifetime                          21.82
best fit_MaxLifetime                             46.45
data_MedianLifetime                              22.0
data_MaxLifetime                                 47.0
ML_lnprob                              -3412.844187


                                                            percentile_16
\
xc/eta                                                   [351.239, 375.394]
beta/eta                                                     [4.707, 6.545]
xc^2/epsilon                                             [120.353, 129.285]
xc                                                      [809.477, 1660.612]
eta                                                          [1.837, 4.015]
beta                                                         [3.385, 6.948]
epsilon                                              [1997.853, 10081.668]
sqrt(xc/eta)                                              [18.741, 19.375]
s= eta^0.5*xc^1.5/epsilon                                    [6.397, 6.57]
beta*xc/epsilon                                             [1.647, 2.206]
eta*xc/epsilon                                              [0.352, 0.362]
Fx=beta^2/eta*xc                                           [0.0707, 0.155]
Dx =beta*epsilon/eta*xc^2                                [0.0441, 0.0656]
Pk=beta*k/epsilon                                     [0.00104, 0.00291]
Fk=beta^2/eta*k                                            [29.896, 73.98]
Dk =beta*epsilon/eta*k^2                        [27661.038, 112787.169]
Fk^2/Dk=beta^3/eta*epsilon                                  [0.102, 0.32]
epsilon/beta^2                                            [19.536, 37.854]
k/beta                                                    [0.0719, 0.148]
k^2/epsilon                                         [5.09e-05, 0.000215]
eta/xc                                                  [0.00266, 0.00285]
beta/xc                                                  [0.0157, 0.0228]
epsilon/xc^2                                            [0.00773, 0.00831]
k/xc                                                  [0.000472, 0.000968]
best fit no ext hazard_MedianLifetime                     [21.23, 22.23]
best fit no ext hazard_MaxLifetime                        [53.05, 53.05]
best fit_MedianLifetime          [21.330000000000002, 22.330000000000002]
best fit_MaxLifetime                                      [46.45, 46.45]
data_MedianLifetime                                        [21.5, 22.56]
data_MaxLifetime                                            [47.0, 47.0]
ML_lnprob                  [-3412.844186794696, -3412.844186794696]


                                                            percentile_50
\
```

```
xc/eta                                      [307.491, 388.087]
beta/eta                                        [2.777, 7.977]
xc^2/epsilon                               [108.098, 133.997]
xc                                        [301.381, 3114.039]
eta                                            [0.516, 6.545]
beta                                          [2.16, 22.354]
epsilon                              [192.825, 35504.709]
sqrt(xc/eta)                                   [17.535, 19.7]
s= eta^0.5*xc^1.5/epsilon                      [6.065, 6.747]
beta*xc/epsilon                                [0.988, 2.955]
eta*xc/epsilon                                 [0.342, 0.372]
Fx=beta^2/eta*xc                               [0.0236, 0.289]
Dx =beta*epsilon/eta*xc^2                      [0.022, 0.0884]
Pk=beta*k/epsilon                          [0.000323, 0.0109]
Fk=beta^2/eta*k                               [8.932, 157.41]
Dk =beta*epsilon/eta*k^2          [9639.956, 779018.247]
Fk^2/Dk=beta^3/eta*epsilon                    [0.0208, 0.999]
epsilon/beta^2                               [8.545, 120.465]
k/beta                                         [0.035, 0.303]
k^2/epsilon                              [1.73e-05, 0.00223]
eta/xc                                     [0.00258, 0.00325]
beta/xc                                     [0.00812, 0.0333]
epsilon/xc^2                                [0.00746, 0.00925]
k/xc                                      [0.000192, 0.00199]
best fit no ext hazard_MedianLifetime           [21.23, 22.23]
best fit no ext hazard_MaxLifetime              [53.05, 53.05]
best fit_MedianLifetime      [21.330000000000002, 22.330000000000002]
best fit_MaxLifetime                            [46.45, 46.45]
data_MedianLifetime                             [21.5, 22.56]
data_MaxLifetime                                  [47.0, 47.0]
ML_lnprob               [-3412.844186794696, -3412.844186794696]

                                                  percentile_95
\
xc/eta                                        [227.956, 401.21]
beta/eta                                        [0.212, 10.384]
xc^2/epsilon                                     [81.18, 138.88]
xc                                          [41.777, 26885.351]
eta                                            [0.0806, 61.954]
beta                                           [0.273, 50.196]
epsilon                              [3.688, 2659926.484]
sqrt(xc/eta)                                    [15.098, 19.7]
s= eta^0.5*xc^1.5/epsilon                       [5.308, 7.117]
beta*xc/epsilon                                 [0.0765, 3.679]
eta*xc/epsilon                                   [0.323, 0.394]
Fx=beta^2/eta*xc                             [9.88e-05, 0.463]
Dx =beta*epsilon/eta*xc^2                       [0.00151, 0.131]
```

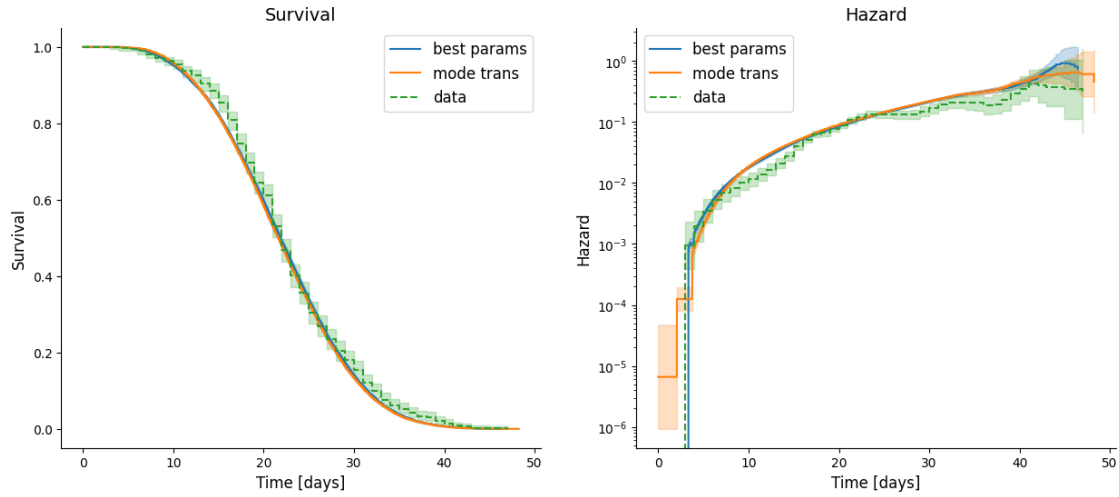|	
Pk=beta*k/epsilon	[2.21e-06, 0.0472]
Fk=beta^2/eta*k	[0.322, 712.625]
Dk =beta*epsilon/eta*k^2	[119.29, 9114487.958]
Fk^2/Dk=beta^3/eta*epsilon	[2.88e-06, 1.575]
epsilon/beta^2	[5.203, 54731.02]
k/beta	[0.00995, 1.828]
k^2/epsilon	[4.57e-08, 0.0396]
eta/xc	[0.00249, 0.00439]
beta/xc	[0.000532, 0.0484]
epsilon/xc^2	[0.0072, 0.0123]
k/xc	[1.86e-05, 0.0143]
best fit no ext hazard_MedianLifetime	[21.23, 22.23]
best fit no ext hazard_MaxLifetime	[53.05, 53.05]
best fit_MedianLifetime	[21.330000000000002, 22.330000000000002]
best fit_MaxLifetime	[46.45, 46.45]
data_MedianLifetime	[21.5, 22.56]
data_MaxLifetime	[47.0, 47.0]
ML_lnprob	[-3412.844186794696, -3412.844186794696]

	max_likelihood	mode_overall
xc/eta	264.334	299.784
beta/eta	5.961	3.744
xc^2/epsilon	96.471	111.104
xc	1627.92	197.03
eta	6.159	0.195
beta	36.709	1.669
epsilon	27470.697	25.586
sqrt(xc/eta)	16.258	17.314
s= eta^0.5*xc^1.5/epsilon	5.934	6.417
beta*xc/epsilon	2.175	1.388
eta*xc/epsilon	0.365	0.334
Fx=beta^2/eta*xc	0.134	0.0388
Dx =beta*epsilon/eta*xc^2	0.0618	0.0327
Pk=beta*k/epsilon	0.000668	0.0326
Fk=beta^2/eta*k	437.612	28.57
Dk =beta*epsilon/eta*k^2	654966.76	160988.632
Fk^2/Dk=beta^3/eta*epsilon	0.292	0.129
epsilon/beta^2	20.386	9.187
k/beta	0.0136	0.3
k^2/epsilon	0.000009	0.00977
eta/xc	0.00378	0.00334
beta/xc	0.0225	0.0125
epsilon/xc^2	0.0104	0.009
k/xc	0.000307	0.00254
best fit no ext hazard_MedianLifetime	21.72	NaN
best fit no ext hazard_MaxLifetime	53.05	NaN
best fit_MedianLifetime	21.82	NaN

```
best fit_MaxLifetime                              46.45            NaN
data_MedianLifetime                               22.0             NaN
data_MaxLifetime                                  47.0             NaN
ML_lnprob                              -3412.844187 -3412.844187
```

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