mcmc_analysis_Guiniea_pig_VC_baysian

November 24, 2025

1 # 1. Density coner plot
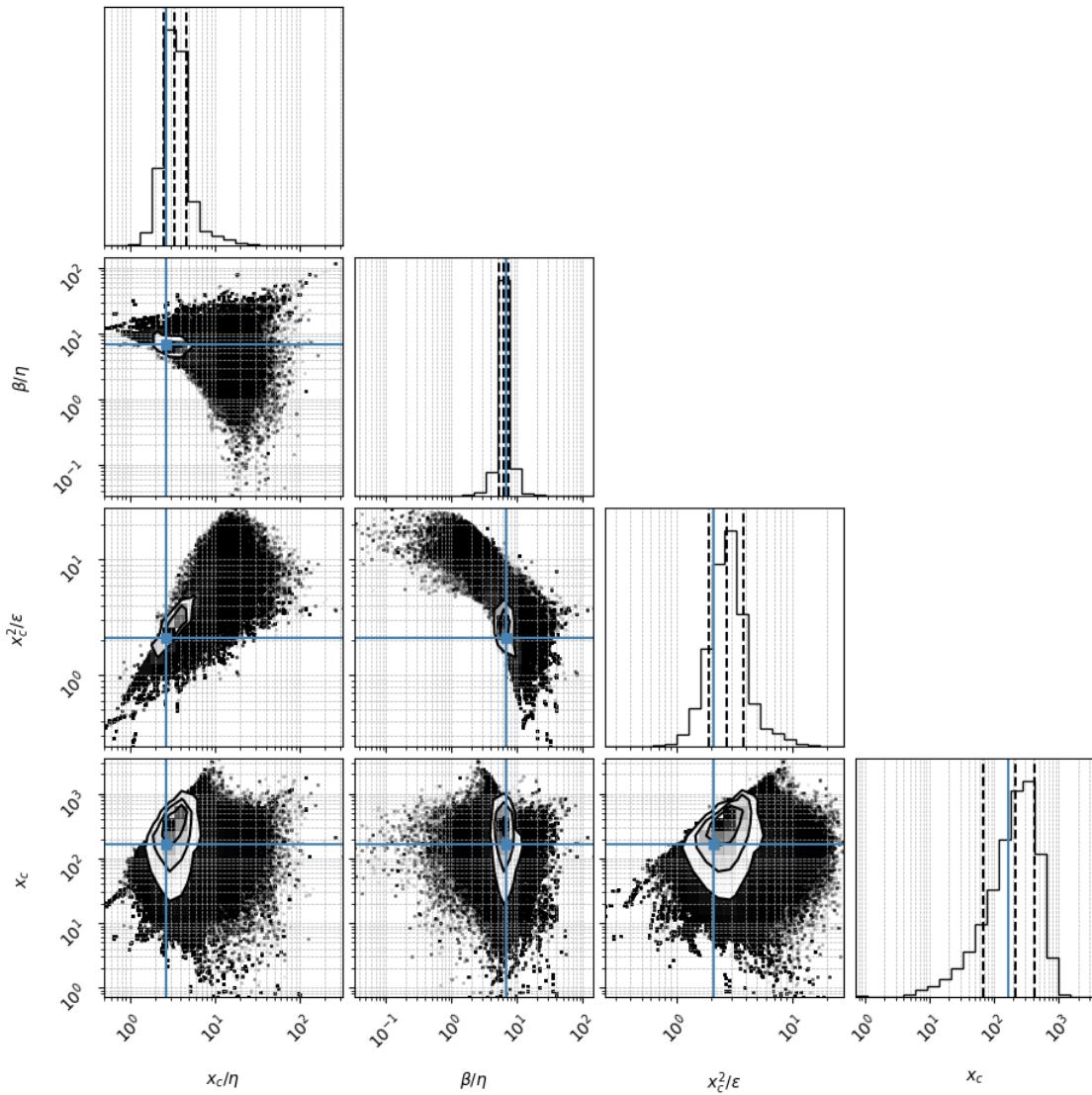
A sample is 1 parameter set scanned. For the corner plot below, the quantiles (represented by the solid lines) are 0.16,0.5,0.84 of the samples. Dots represent individual samples (outside the line surrounding 0.84 of the samples) The parameter search is performed in the transformed space of x_c/η, β/η, x_c^2/ϵ, x_c but we also show the regular parameters
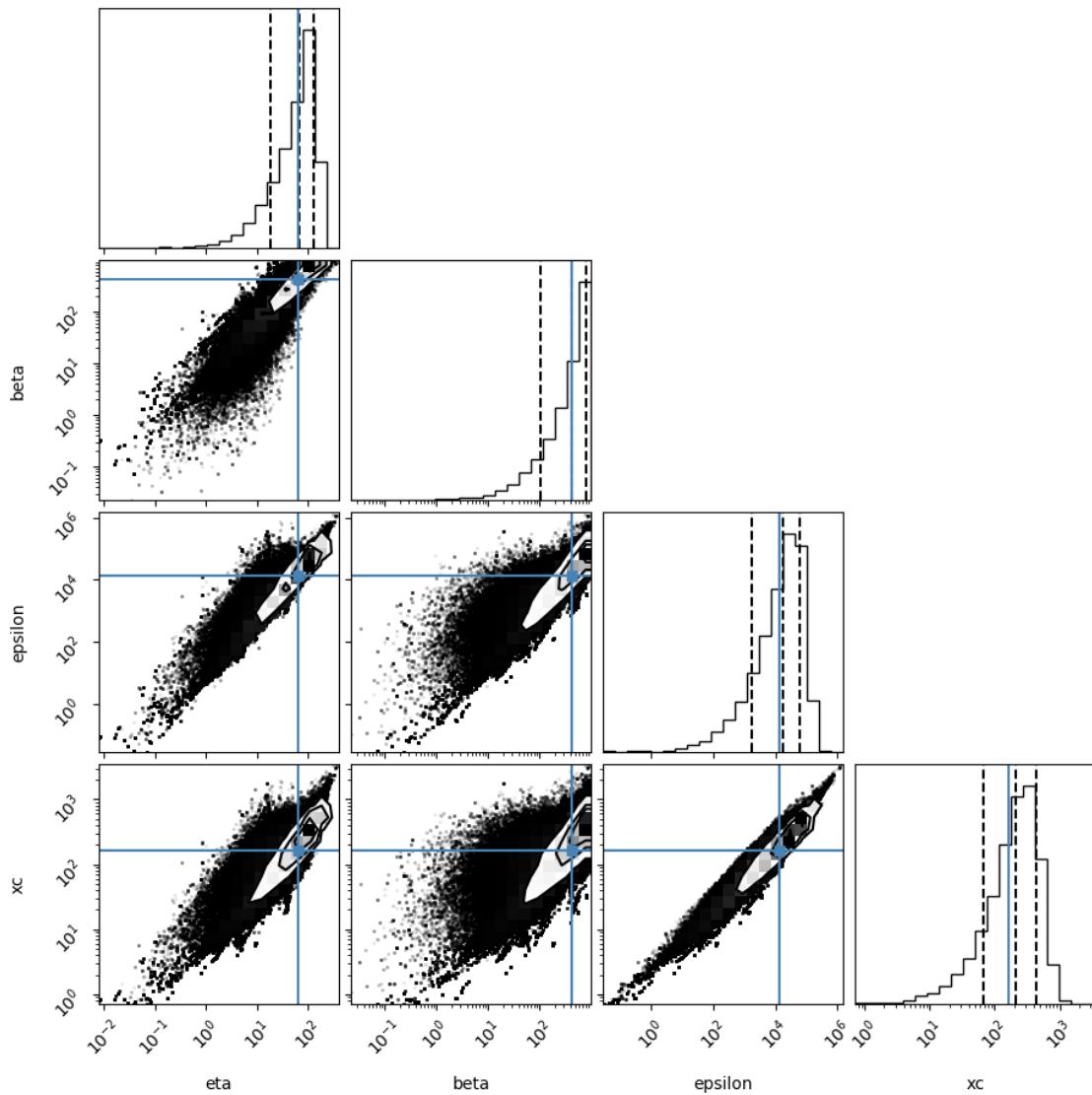
```
WARNING:root:Too few points to create valid contours
```

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

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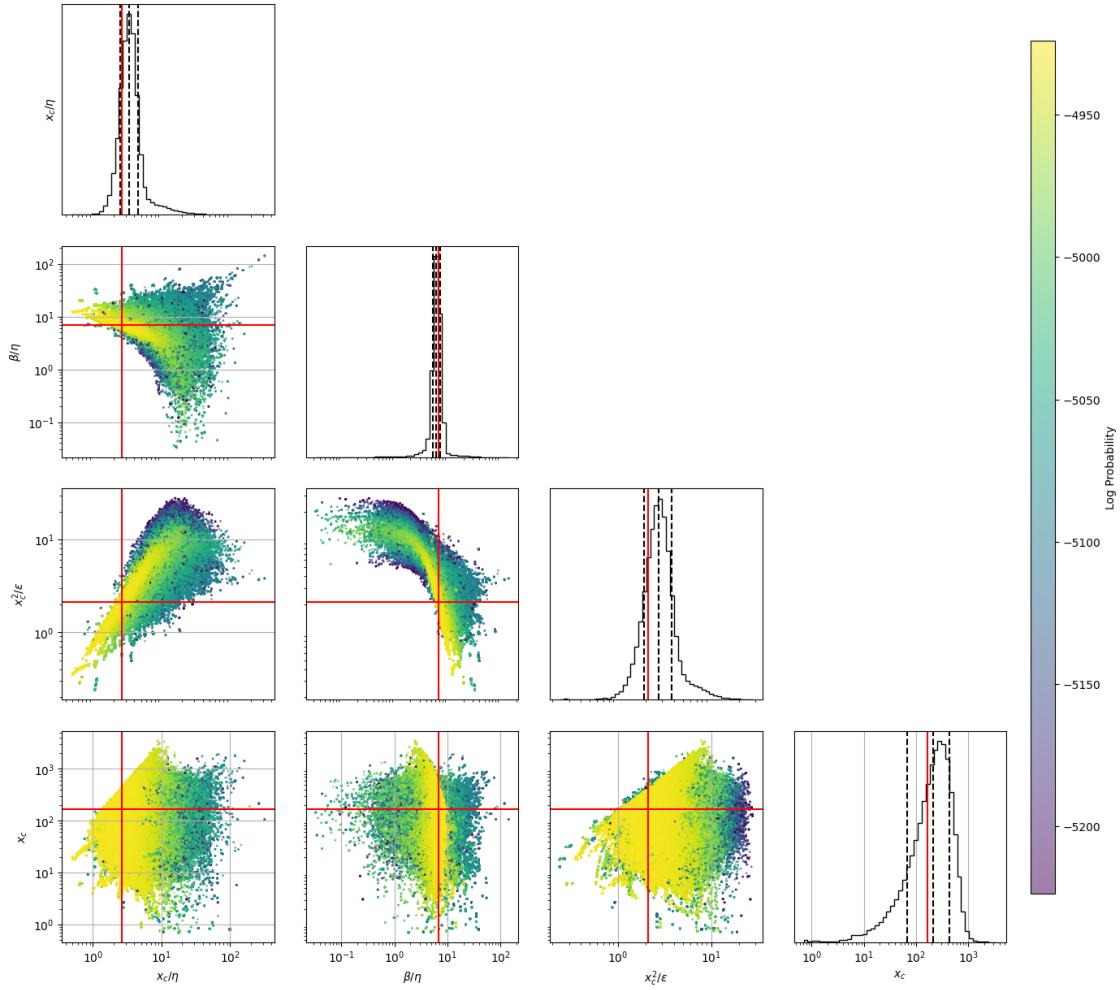
```
(16,)
```
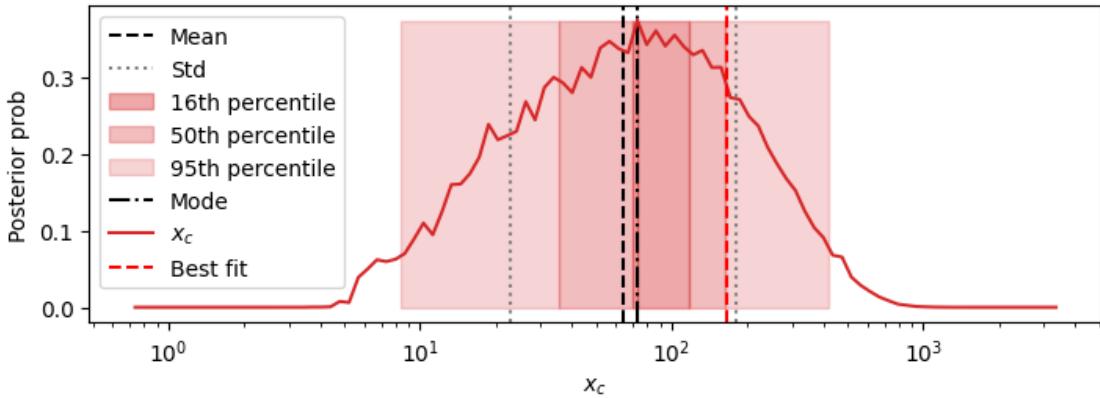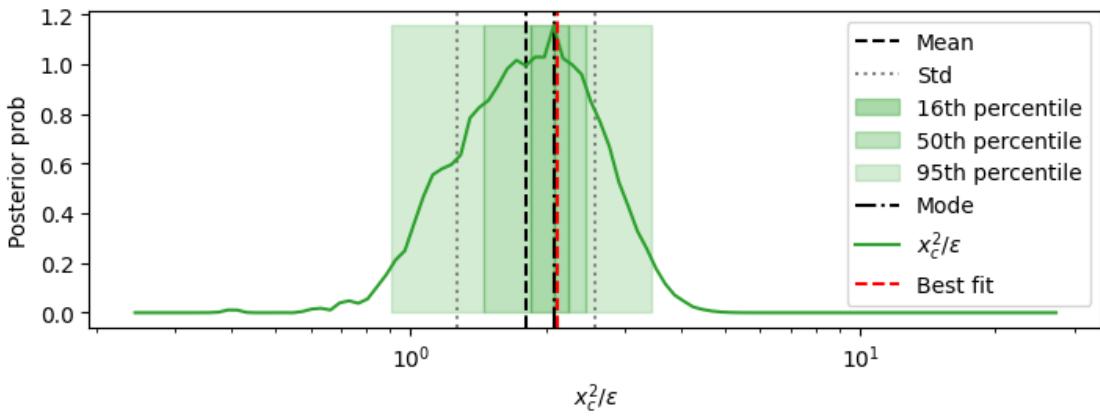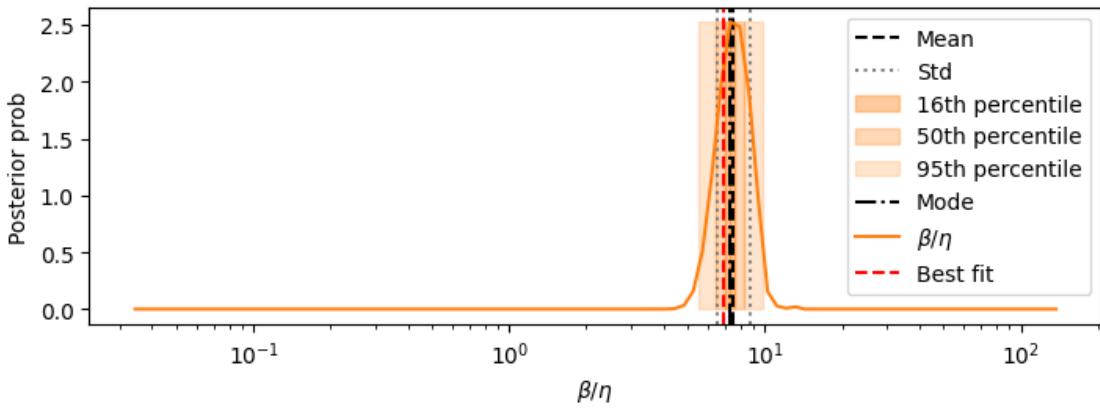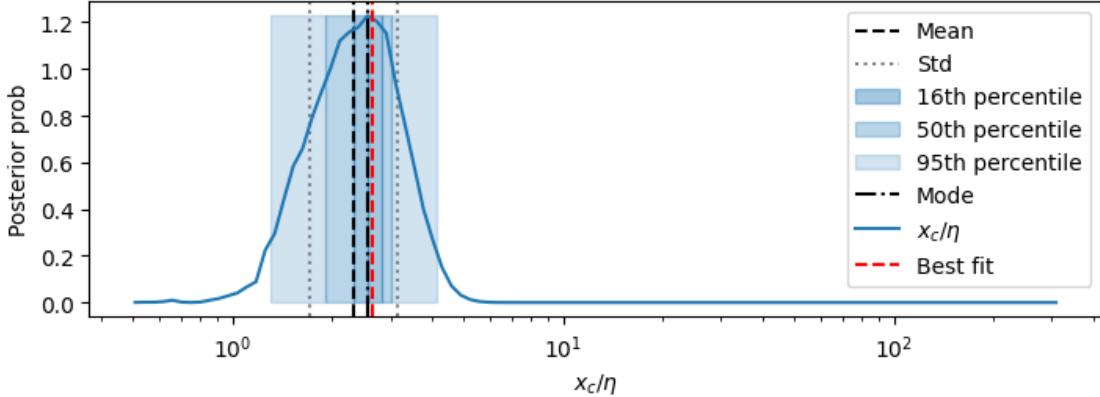
2 2. Heat map corner plot of raw samples

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
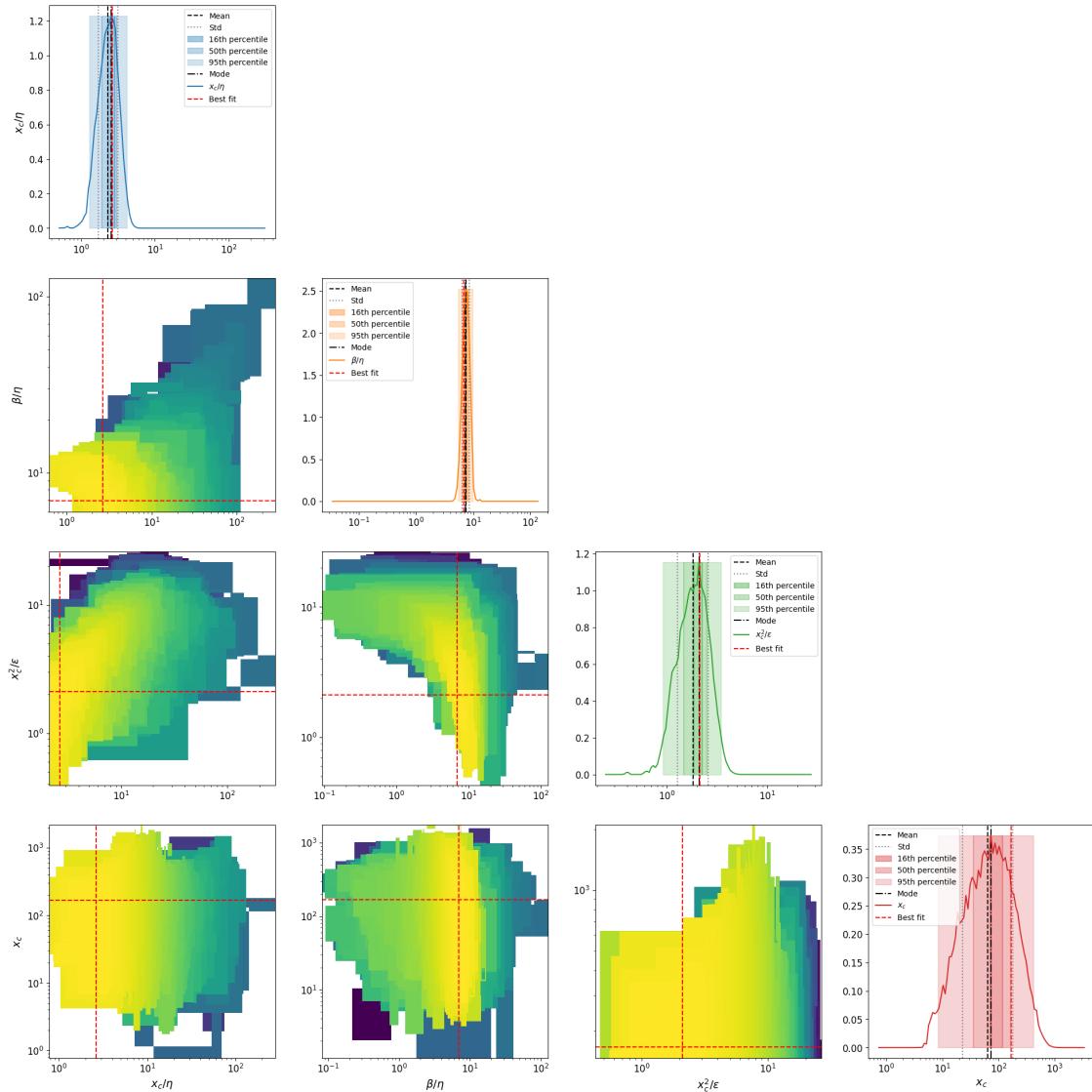
2D marginalizations of posterior distributions

```
/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


```
Rescaling the samples TIME by 365
```

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                                  2.317
beta/eta                                  7.5
xc^2/epsilon                             1.81
xc                                     64.013
eta                                    25.412
beta                                  192.824
epsilon                              1869.351
sqrt(xc/eta)                            1.534
s= eta^0.5*xc^1.5/epsilon                 1.2
beta*xc/epsilon                         5.822
eta*xc/epsilon                          0.782
Fx=beta^2/eta*xc                       24.017
Dx =beta*epsilon/eta*xc^2               4.113
Pk=beta*k/epsilon                      0.0494
Fk=beta^2/eta*k                      2982.174
Dk =beta*epsilon/eta*k^2            58155.574
Fk^2/Dk=beta^3/eta*epsilon            148.597
epsilon/beta^2                          0.051
k/beta                                0.00264
k^2/epsilon                          0.000137
eta/xc                                   0.43
beta/xc                                 3.224
epsilon/xc^2                            0.551
k/xc                                  0.00804
best fit no ext hazard_MedianLifetime    4.09
best fit no ext hazard_MaxLifetime       10.0
best fit_MedianLifetime                   4.1
best fit_MaxLifetime                     10.0
data_MedianLifetime                      4.02
data_MaxLifetime                         10.0
ML_lnprob                         -4923.74078

std  \
xc/eta                                                    [0.618,
0.842]
beta/eta                                                  [1.028,
1.191]
xc^2/epsilon                                             [0.538,
0.766]
xc                                                        [41.11,
114.896]
```

```
eta                                             [16.882,
50.291]
beta                                           [128.884,
388.671]
epsilon                                      [1645.397,
13734.208]
sqrt(xc/eta)                                      [0.219,
0.255]
s= eta^0.5*xc^1.5/epsilon                         [0.218,
0.266]
beta*xc/epsilon                                   [0.578,
0.642]
eta*xc/epsilon                                   [0.0541,
0.0581]
Fx=beta^2/eta*xc                                 [10.744,
19.44]
Dx =beta*epsilon/eta*xc^2                          [1.612,
2.65]
Pk=beta*k/epsilon                                [0.0334,
0.103]
Fk=beta^2/eta*k                                 [2053.163,
6590.766]
Dk =beta*epsilon/eta*k^2                       [51594.123,
457289.98]
Fk^2/Dk=beta^3/eta*epsilon                       [75.989,
155.517]
epsilon/beta^2                                   [0.0223,
0.0396]
k/beta                                          [0.00177,
0.00537]
k^2/epsilon                                    [0.000121,
0.00103]
eta/xc                                            [0.115,
0.157]
beta/xc                                           [1.163,
1.82]
epsilon/xc^2                                      [0.164,
0.234]
k/xc                                             [0.0052,
0.0147]
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                                    [-4923.7407795883355,
-4923.7407795883355]


                                          mode  \
xc/eta                                    2.559
beta/eta                                  7.322
xc^2/epsilon                              2.083
xc                                       73.038
eta                                      39.078
beta                                    692.355
epsilon                                8048.645
sqrt(xc/eta)                              1.549
s= eta^0.5*xc^1.5/epsilon                 1.285
beta*xc/epsilon                           5.894
eta*xc/epsilon                            0.76
Fx=beta^2/eta*xc                         24.695
Dx =beta*epsilon/eta*xc^2                 3.456
Pk=beta*k/epsilon                         0.0612
Fk=beta^2/eta*k                        8181.888
Dk =beta*epsilon/eta*k^2             232266.557
Fk^2/Dk=beta^3/eta*epsilon             138.157
epsilon/beta^2                            0.057
k/beta                                    0.000648
k^2/epsilon                               0.000026
eta/xc                                    0.391
beta/xc                                   2.838
epsilon/xc^2                              0.48
k/xc                                      0.00684
best fit no ext hazard_MedianLifetime     4.09
best fit no ext hazard_MaxLifetime       10.0
best fit_MedianLifetime                   4.1
best fit_MaxLifetime                     10.0
data_MedianLifetime                       4.02
data_MaxLifetime                         10.0
ML_lnprob                             -4923.74078

percentile_16  \
xc/eta                                                        [2.322,
2.82]
beta/eta                                                      [7.021,
7.635]
xc^2/epsilon                                                 [1.849,
```

```
2.237]
xc                                                    [69.994,
116.652]
eta                                                   [37.019,
63.597]
beta                                                 [476.056,
812.914]
epsilon                                            [4307.295,
12579.526]
sqrt(xc/eta)                                           [1.524,
1.626]
s= eta^0.5*xc^1.5/epsilon                              [1.218,
1.355]
beta*xc/epsilon                                        [5.678,
6.118]
eta*xc/epsilon                                          [0.74,
0.78]
Fx=beta^2/eta*xc                                      [19.054,
26.925]
Dx =beta*epsilon/eta*xc^2                              [3.265,
4.097]
Pk=beta*k/epsilon                                     [0.0439,
0.0748]
Fk=beta^2/eta*k                                      [7497.97,
12659.097]
Dk =beta*epsilon/eta*k^2                           [142042.101,
379801.152]
Fk^2/Dk=beta^3/eta*epsilon                           [122.316,
199.09]
epsilon/beta^2                                        [0.0435,
0.0623]
k/beta                                              [0.000496,
0.000847]
k^2/epsilon                                         [1.98e-05,
5.8e-05]
eta/xc                                                 [0.355,
0.431]
beta/xc                                                 [2.69,
3.333]
epsilon/xc^2                                            [0.469,
0.567]
k/xc                                                  [0.00467,
0.00778]
best fit no ext hazard_MedianLifetime      [3.5999999999999996,
4.6]
best fit no ext hazard_MaxLifetime                      [10.0,
10.0]
```

```
best fit_MedianLifetime                                    [3.6099999999999994,
4.609999999999999]
best fit_MaxLifetime                                                    [10.0,
10.0]
data_MedianLifetime                                        [3.5599999999999996,
4.56]
data_MaxLifetime                                                       [10.0,
10.0]
ML_lnprob                                          [-4923.7407795883355,
-4923.7407795883355]

percentile_50  \
xc/eta                                                                [1.912,
3.008]
beta/eta                                                              [6.457,
8.302]
xc^2/epsilon                                                          [1.457,
2.461]
xc                                                                  [35.423,
163.976]
eta                                                                [21.549,
109.257]
beta                                                              [202.227,
1006.93]
epsilon                                                         [863.009,
21497.804]
sqrt(xc/eta)                                                         [1.383,
1.734]
s= eta^0.5*xc^1.5/epsilon                                            [1.057,
1.455]
beta*xc/epsilon                                                      [5.678,
6.591]
eta*xc/epsilon                                                        [0.74,
0.823]
Fx=beta^2/eta*xc                                                   [13.484,
32.007]
Dx =beta*epsilon/eta*xc^2                                           [2.602,
5.758]
Pk=beta*k/epsilon                                                  [0.0173,
0.0975]
Fk=beta^2/eta*k                                                 [2630.423,
15073.789]
Dk =beta*epsilon/eta*k^2                                        [35844.474,
1015536.342]
Fk^2/Dk=beta^3/eta*epsilon                                        [75.148,
253.999]
epsilon/beta^2                                                     [0.0364,
```

```
0.0893]
k/beta                                                        [0.000496,
0.00247]
k^2/epsilon                                                   [9.71e-06,
0.000242]
eta/xc                                                            [0.332,
0.523]
beta/xc                                                            [2.17,
4.131]
epsilon/xc^2                                                      [0.406,
0.686]
k/xc                                                             [0.0028,
0.0141]
best fit no ext hazard_MedianLifetime            [3.5999999999999996,
4.6]
best fit no ext hazard_MaxLifetime                                 [10.0,
10.0]
best fit_MedianLifetime                      [3.6099999999999994,
4.609999999999999]
best fit_MaxLifetime                                               [10.0,
10.0]
data_MedianLifetime                              [3.5599999999999996,
4.56]
data_MaxLifetime                                                   [10.0,
10.0]
ML_lnprob                          [-4923.7407795883355,
-4923.7407795883355]

percentile_95  \
xc/eta                                                            [1.296,
4.159]
beta/eta                                                          [5.461,
9.816]
xc^2/epsilon                                                      [0.905,
3.434]
xc                                                                [8.332,
418.281]
eta                                                              [3.072,
151.166]
beta                                                            [23.785,
1006.93]
epsilon                                                        [28.977,
62784.686]
sqrt(xc/eta)                                                      [1.138,
2.039]
s= eta^0.5*xc^1.5/epsilon                                         [0.795,
1.738]
```
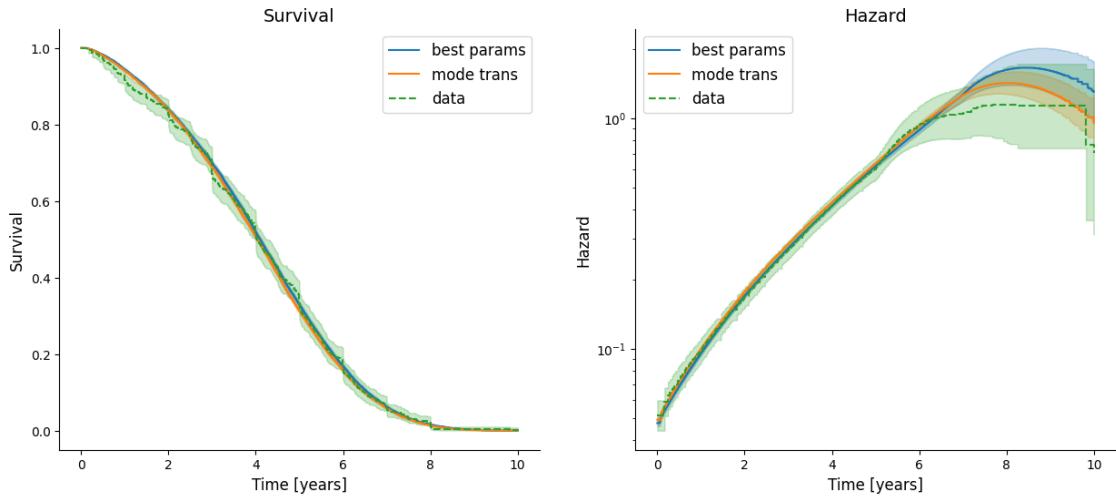
```
beta*xc/epsilon                                              [4.541,
7.101]
eta*xc/epsilon                                               [0.666,
0.915]
Fx=beta^2/eta*xc                                             [8.027,
75.975]
Dx =beta*epsilon/eta*xc^2                                    [1.653,
11.374]
Pk=beta*k/epsilon                                            [0.00597,
0.421]
Fk=beta^2/eta*k                                          [323.735,
17949.076]
Dk =beta*epsilon/eta*k^2                                 [853.676,
2230523.602]
Fk^2/Dk=beta^3/eta*epsilon                               [36.188,
672.921]
epsilon/beta^2                                               [0.0148,
0.153]
k/beta                                                      [0.000496,
0.021]
k^2/epsilon                                                 [3.33e-06,
0.00862]
eta/xc                                                       [0.24,
0.823]
beta/xc                                                      [1.413,
7.863]
epsilon/xc^2                                                 [0.291,
1.105]
k/xc                                                        [0.00119,
0.06]
best fit no ext hazard_MedianLifetime          [3.5999999999999996,
4.6]
best fit no ext hazard_MaxLifetime                          [10.0,
10.0]
best fit_MedianLifetime                  [3.6099999999999994,
4.609999999999999]
best fit_MaxLifetime                                        [10.0,
10.0]
data_MedianLifetime                          [3.5599999999999996,
4.56]
data_MaxLifetime                                            [10.0,
10.0]
ML_lnprob                       [-4923.7407795883355,
-4923.7407795883355]

                                  max_likelihood mode_overall
xc/eta                                    2.648        2.566
```

beta/eta	6.927	7.491
xc^2/epsilon	2.119	2.093
xc	166.491	13.497
eta	62.873	13.521
beta	435.54	119.359
epsilon	13081.872	407.453
sqrt(xc/eta)	1.627	1.485
s= eta^0.5*xc^1.5/epsilon	1.302	1.131
beta*xc/epsilon	5.543	6.24
eta*xc/epsilon	0.8	0.745
Fx=beta^2/eta*xc	18.122	26.859
Dx =beta*epsilon/eta*xc^2	3.269	4.602
Pk=beta*k/epsilon	0.0166	0.226
Fk=beta^2/eta*k	6034.273	590.28
Dk =beta*epsilon/eta*k^2	362490.627	2608.542
Fk^2/Dk=beta^3/eta*epsilon	100.451	133.573
epsilon/beta^2	0.069	0.0358
k/beta	0.00115	0.00382
k^2/epsilon	0.000019	0.000407
eta/xc	0.378	0.467
beta/xc	2.616	3.718
epsilon/xc^2	0.472	0.594
k/xc	0.003	0.021
best fit no ext hazard_MedianLifetime	4.09	NaN
best fit no ext hazard_MaxLifetime	10.0	NaN
best fit_MedianLifetime	4.1	NaN
best fit_MaxLifetime	10.0	NaN
data_MedianLifetime	4.02	NaN
data_MaxLifetime	10.0	NaN
ML_lnprob	-4923.74078	-4923.74078

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')