mcmc_analysis_Sweden_F_1910_homo_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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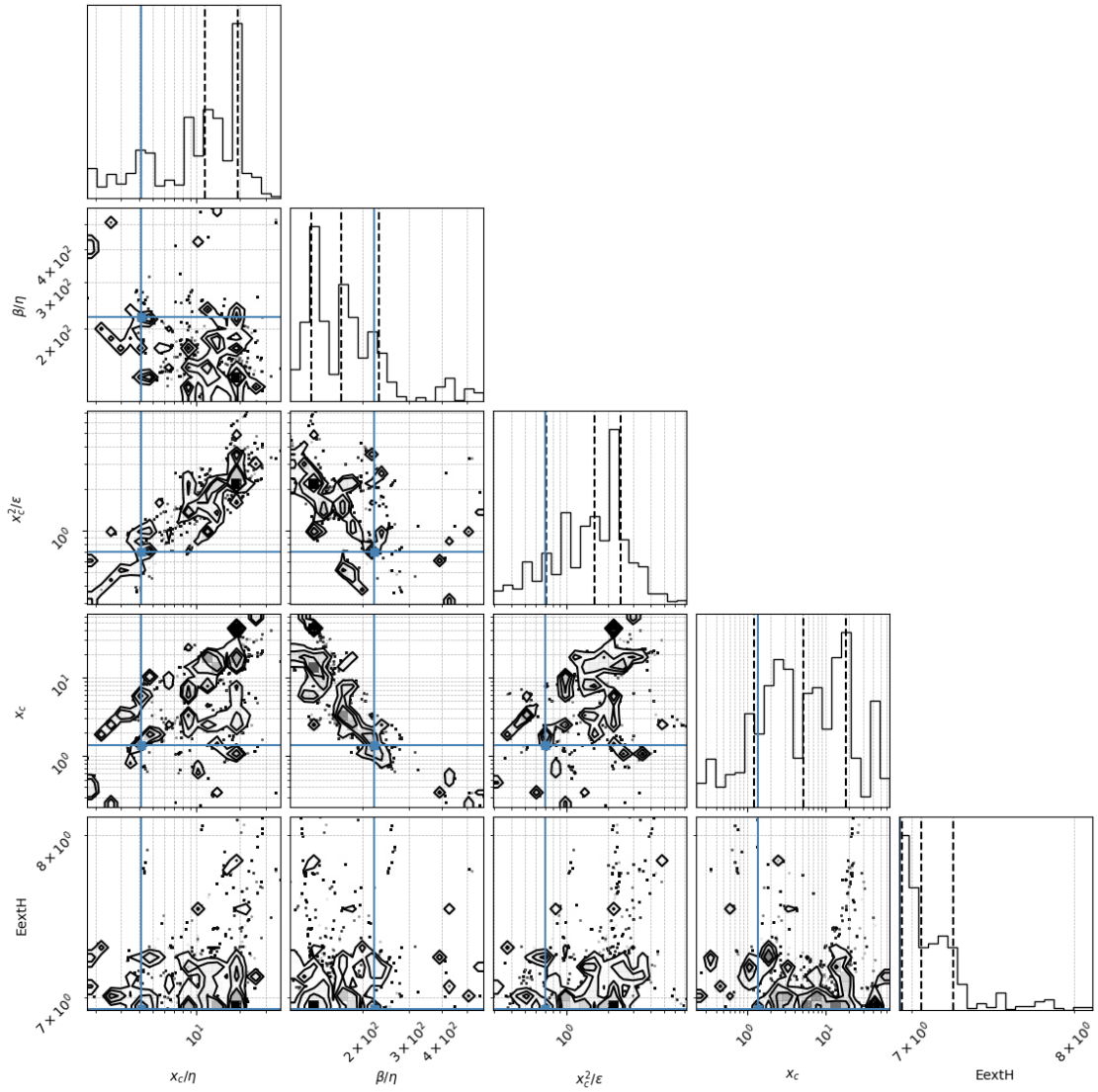
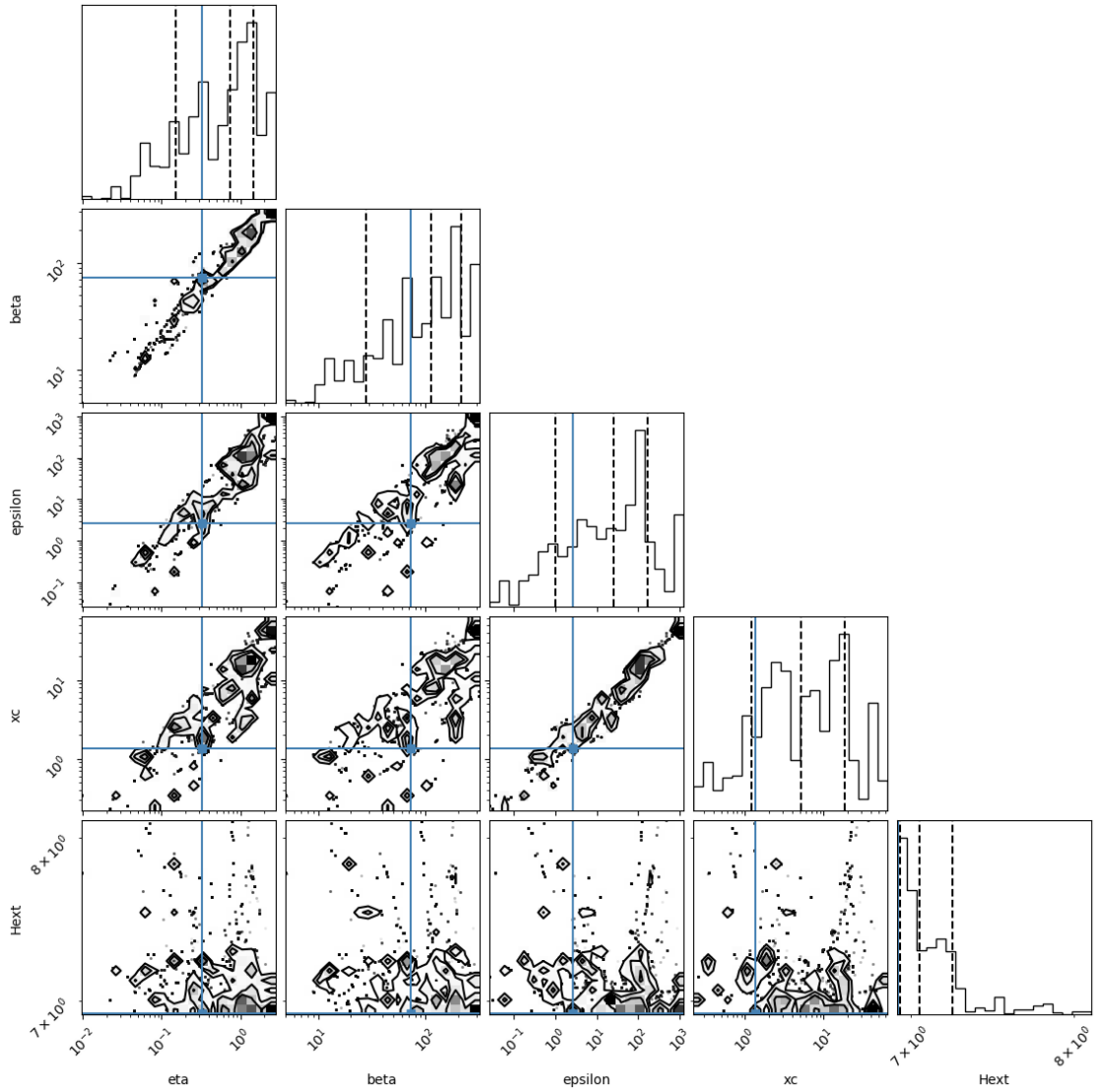
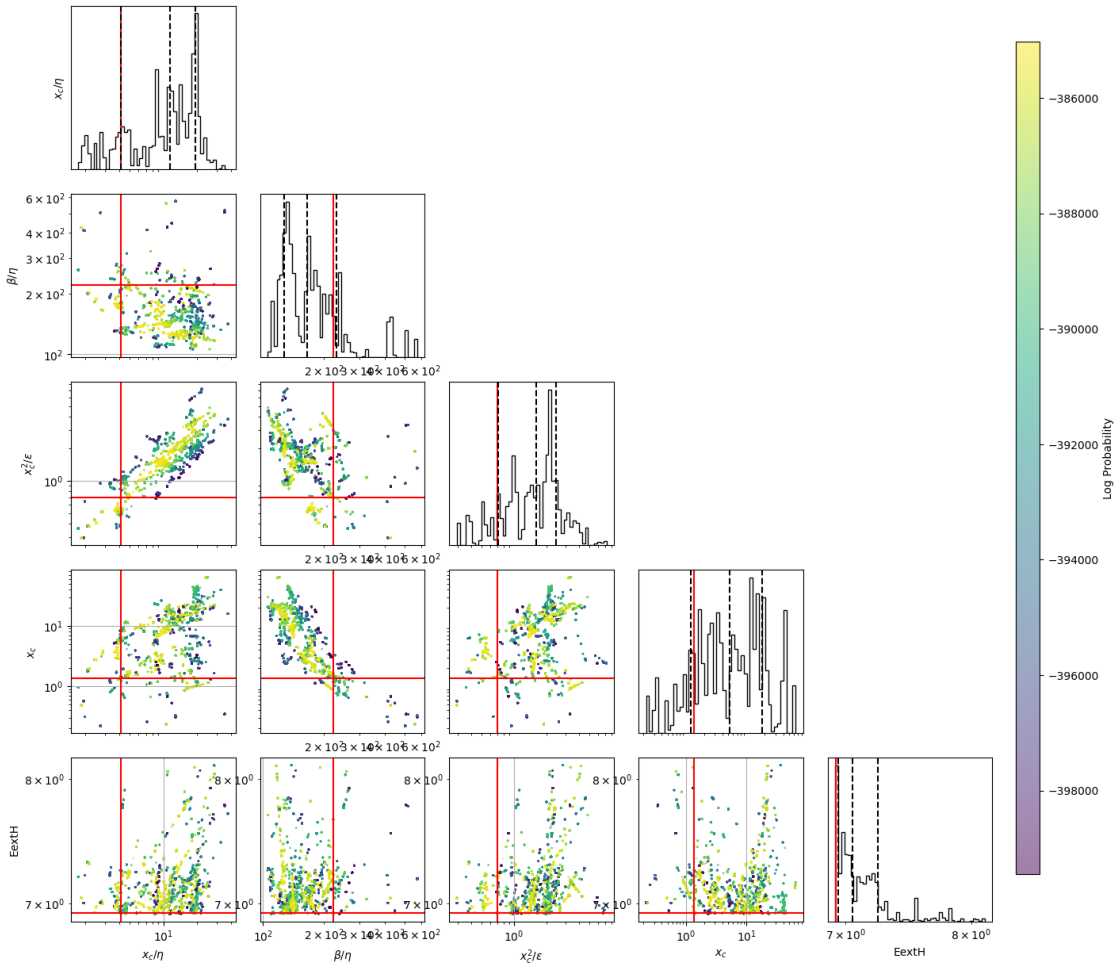

x_c/η
β/η
x_c^2/ε
x_c
EextH



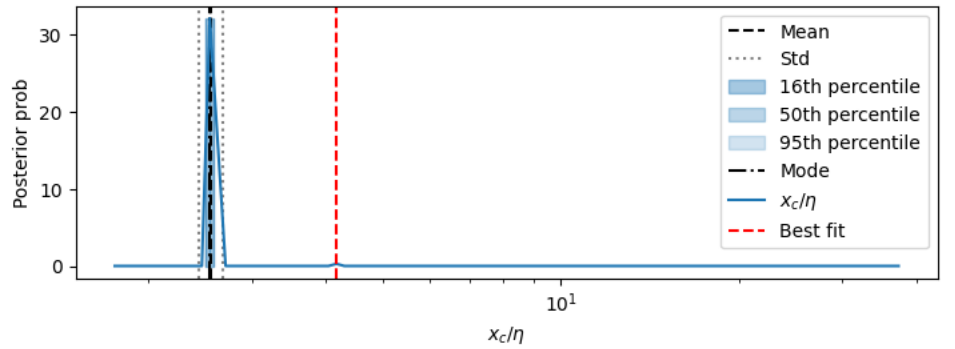
2 2. Heat map corner plot of raw samples

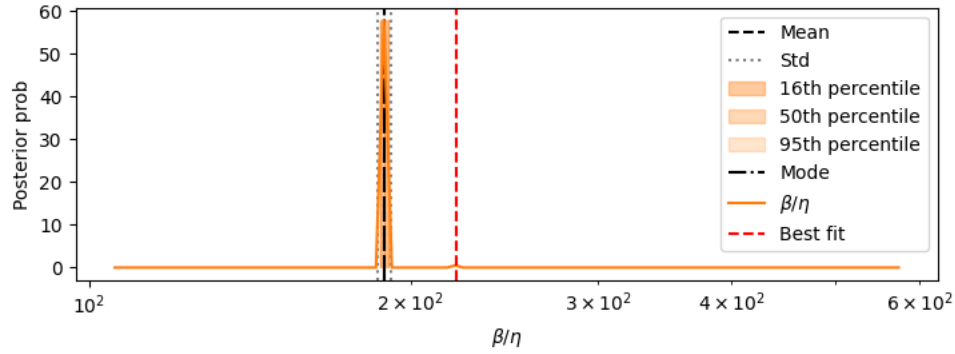
This plot shows all the raw sample points and their lnprobability

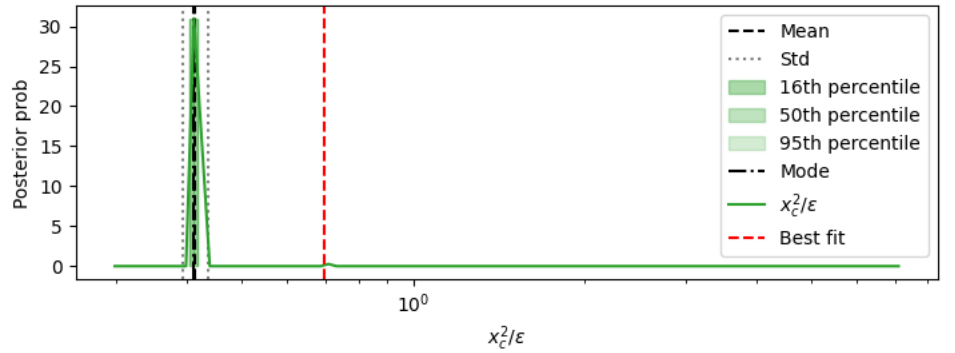


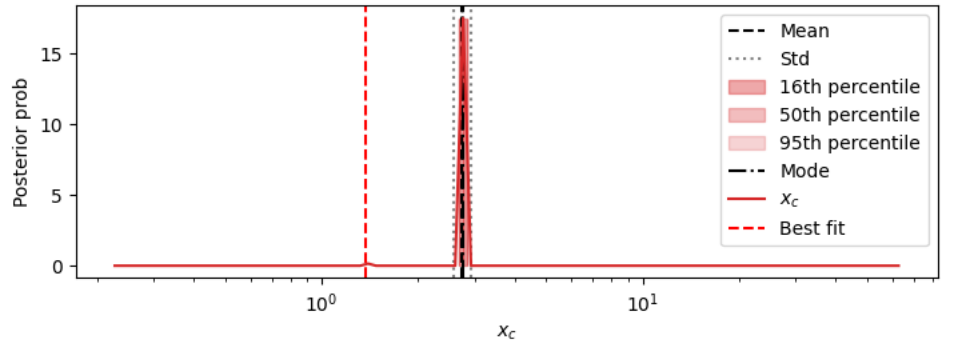
3 3. Posterior distributions of parameters

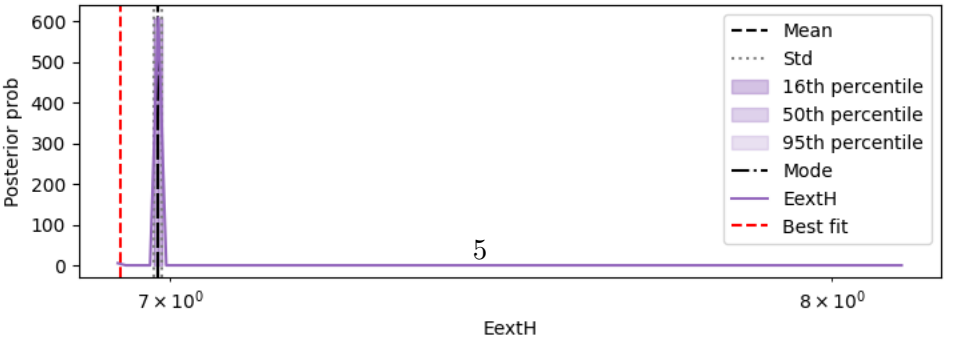
1d marginalizations of posterior distributions. we use a grid of size nbins=100-150


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


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

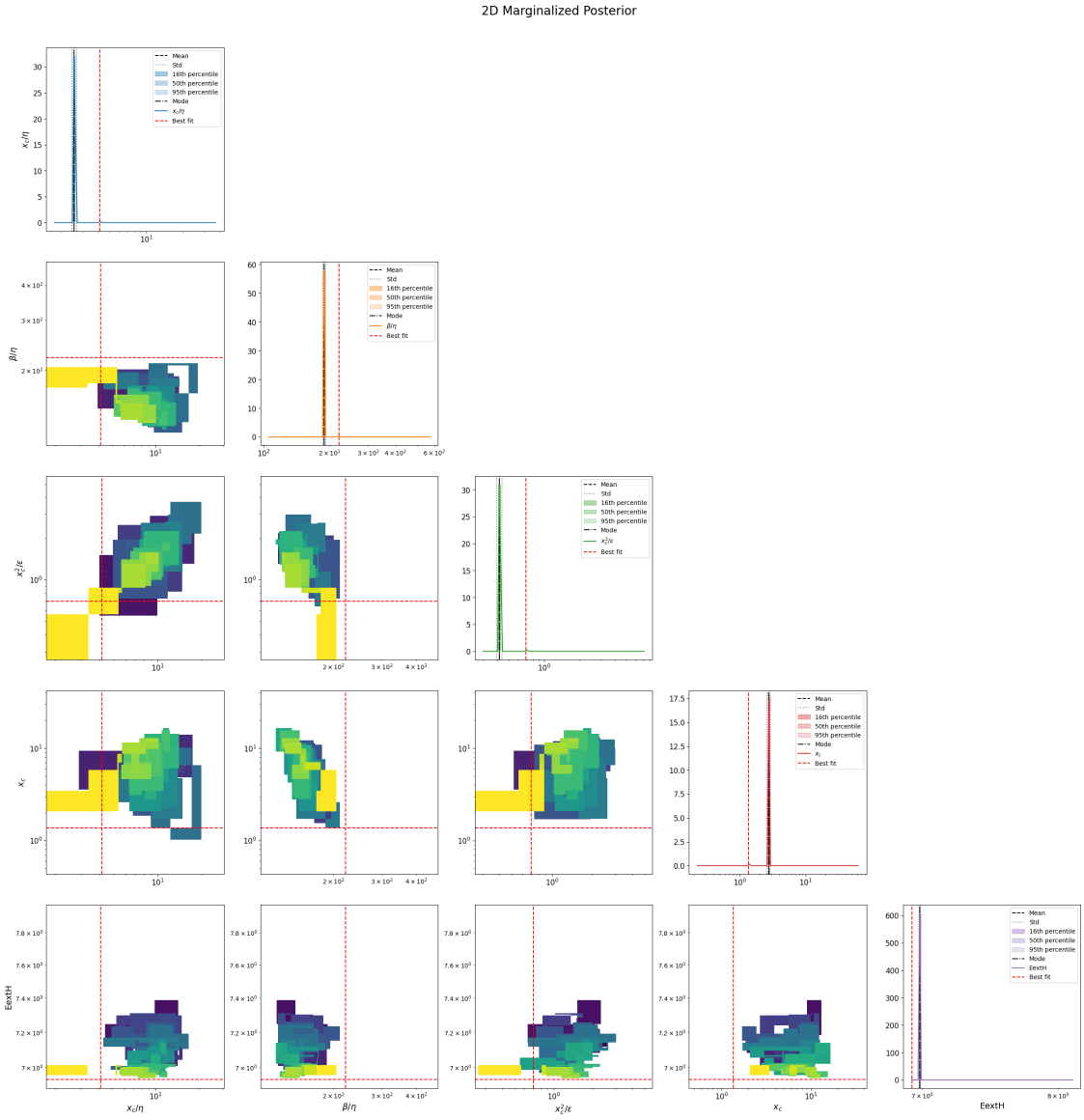

Posterior prob
Mean
Std
16th percentile
50th percentile
95th percentile
Mode
x_c^2/ε
Best fit
x_c^2/ε


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


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

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 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	2.555	
beta/eta	189.189	
xc^2/epsilon	0.414	
xc	2.743	
ExtH	6.983	
eta	1.084	
beta	204.626	
epsilon	19.07	
sqrt(xc/eta)	1.595	
s= eta^0.5*xc^1.5/epsilon	0.258	
beta*xc/epsilon	30.232	
eta*xc/epsilon	0.167	
Fx=beta^2/eta*xc	11562.621	
Dx =beta*epsilon/eta*xc^2	320.135	
Pk=beta*k/epsilon	5.387	
Fk=beta^2/eta*k	76538.365	
Dk =beta*epsilon/eta*k^2	13497.074	
Fk^2/Dk=beta^3/eta*epsilon	419439.782	
epsilon/beta^2	0.000442	
k/beta	0.00244	
k^2/epsilon	0.0146	
eta/xc	0.391	
beta/xc	74.306	
epsilon/xc^2	2.418	
k/xc	0.182	
best fit no ext hazard_MedianLifetime	82.69	
best fit no ext hazard_MaxLifetime	110.0	
best fit_MedianLifetime	81.64	
best fit_MaxLifetime	109.05	
data_MedianLifetime	79.5	
data_MaxLifetime	110.0	
ML_lnprob	-385019.418367	

	std	\
xc/eta	[0.114, 0.12]	
beta/eta	[2.676, 2.714]	
xc^2/epsilon	[0.0203, 0.0214]	
xc	[0.168, 0.179]	
ExtH	[0.00527, 0.00527]	
eta	[0.113, 0.126]	

beta	[18.809, 20.713]
epsilon	[3.141, 3.76]
sqrt(xc/eta)	[0.000134, 0.000134]
s= eta^0.5*xc^1.5/epsilon	[2.59e-05, 2.59e-05]
beta*xc/epsilon	[0.00215, 0.00215]
eta*xc/epsilon	[1.45e-06, 1.45e-06]
Fx=beta^2/eta*xc	[0.704, 0.704]
Dx =beta*epsilon/eta*xc^2	[0.0314, 0.0314]
Pk=beta*k/epsilon	[0.462, 0.505]
Fk=beta^2/eta*k	[5927.877, 6425.533]
Dk =beta*epsilon/eta*k^2	[1989.906, 2334.015]
Fk^2/Dk=beta^3/eta*epsilon	[2995.248, 3016.791]
epsilon/beta^2	[5.23e-06, 5.3e-06]
k/beta	[0.000225, 0.000247]
k^2/epsilon	[0.00228, 0.0027]
eta/xc	[0.0175, 0.0183]
beta/xc	[2.239, 2.308]
epsilon/xc^2	[0.119, 0.125]
k/xc	[0.0111, 0.0119]
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	0.5
data_MaxLifetime	0
ML_lnprob	[-385019.4183674486, -385019.4183674486]

	mode \
xc/eta	2.544
beta/eta	188.938
xc^2/epsilon	0.412
xc	2.759
ExtH	6.983
eta	1.095
beta	206.478
epsilon	19.393
sqrt(xc/eta)	1.595
s= eta^0.5*xc^1.5/epsilon	0.258
beta*xc/epsilon	30.232
eta*xc/epsilon	0.167
Fx=beta^2/eta*xc	11562.621
Dx =beta*epsilon/eta*xc^2	320.135
Pk=beta*k/epsilon	5.342
Fk=beta^2/eta*k	77116.92
Dk =beta*epsilon/eta*k^2	13699.687
Fk^2/Dk=beta^3/eta*epsilon	419159.068
epsilon/beta^2	0.000441

k/beta	0.00242
k^2/epsilon	0.0143
eta/xc	0.393
beta/xc	74.519
epsilon/xc^2	2.429
k/xc	0.181
best fit no ext hazard_MedianLifetime	82.69
best fit no ext hazard_MaxLifetime	110.0
best fit_MedianLifetime	81.64
best fit_MaxLifetime	109.05
data_MedianLifetime	79.5
data_MaxLifetime	110.0
ML_lnprob	-385019.418367

	percentile_16 \
xc/eta	[2.505, 2.583]
beta/eta	[187.33, 190.559]
xc^2/epsilon	[0.405, 0.418]
xc	[2.682, 2.838]
ExtH	[6.978, 6.989]
eta	[1.064, 1.126]
beta	[202.222, 210.822]
epsilon	[18.374, 20.469]
sqrt(xc/eta)	[1.583, 1.607]
s= eta^0.5*xc^1.5/epsilon	[0.255, 0.26]
beta*xc/epsilon	[29.84, 30.629]
eta*xc/epsilon	[0.166, 0.168]
Fx=beta^2/eta*xc	[11252.245, 11881.558]
Dx =beta*epsilon/eta*xc^2	[313.198, 327.225]
Pk=beta*k/epsilon	[5.131, 5.562]
Fk=beta^2/eta*k	[75731.007, 78528.196]
Dk =beta*epsilon/eta*k^2	[13059.686, 14371.053]
Fk^2/Dk=beta^3/eta*epsilon	[403250.012, 435695.769]
epsilon/beta^2	[0.000427, 0.000456]
k/beta	[0.00237, 0.00247]
k^2/epsilon	[0.0136, 0.0151]
eta/xc	[0.387, 0.399]
beta/xc	[72.996, 76.073]
epsilon/xc^2	[2.391, 2.468]
k/xc	[0.176, 0.186]
best fit no ext hazard_MedianLifetime	[82.2, 83.2]
best fit no ext hazard_MaxLifetime	[110.0, 110.0]
best fit_MedianLifetime	[81.15, 82.15]
best fit_MaxLifetime	[109.05, 109.05]
data_MedianLifetime	[79.0, 80.0]
data_MaxLifetime	[110.0, 110.0]

ML_lnprob	[-385019.4183674486, -385019.4183674486]

	percentile_50 \
xc/eta	[2.505, 2.583]
beta/eta	[187.33, 190.559]
xc^2/epsilon	[0.405, 0.418]
xc	[2.682, 2.838]
ExtH	[6.978, 6.989]
eta	[1.064, 1.126]
beta	[202.222, 210.822]
epsilon	[18.374, 20.469]
sqrt(xc/eta)	[1.583, 1.607]
s= eta^0.5*xc^1.5/epsilon	[0.255, 0.26]
beta*xc/epsilon	[29.84, 30.629]
eta*xc/epsilon	[0.166, 0.168]
Fx=beta^2/eta*xc	[11252.245, 11881.558]
Dx =beta*epsilon/eta*xc^2	[313.198, 327.225]
Pk=beta*k/epsilon	[5.131, 5.562]
Fk=beta^2/eta*k	[75731.007, 78528.196]
Dk =beta*epsilon/eta*k^2	[13059.686, 14371.053]
Fk^2/Dk=beta^3/eta*epsilon	[403250.012, 435695.769]
epsilon/beta^2	[0.000427, 0.000456]
k/beta	[0.00237, 0.00247]
k^2/epsilon	[0.0136, 0.0151]
eta/xc	[0.387, 0.399]
beta/xc	[72.996, 76.073]
epsilon/xc^2	[2.391, 2.468]
k/xc	[0.176, 0.186]
best fit no ext hazard_MedianLifetime	[82.2, 83.2]
best fit no ext hazard_MaxLifetime	[110.0, 110.0]
best fit_MedianLifetime	[81.15, 82.15]
best fit_MaxLifetime	[109.05, 109.05]
data_MedianLifetime	[79.0, 80.0]
data_MaxLifetime	[110.0, 110.0]
ML_lnprob	[-385019.4183674486, -385019.4183674486]

	percentile_95 \
xc/eta	[2.505, 2.583]
beta/eta	[187.33, 190.559]
xc^2/epsilon	[0.405, 0.418]
xc	[2.682, 2.838]
ExtH	[6.978, 6.989]
eta	[1.064, 1.126]
beta	[202.222, 210.822]
epsilon	[18.374, 20.469]

sqrt(xc/eta)	[1.583, 1.607]
s= eta^0.5*xc^1.5/epsilon	[0.255, 0.26]
beta*xc/epsilon	[29.84, 30.629]
eta*xc/epsilon	[0.166, 0.168]
Fx=beta^2/eta*xc	[11252.245, 11881.558]
Dx =beta*epsilon/eta*xc^2	[313.198, 327.225]
Pk=beta*k/epsilon	[5.131, 5.562]
Fk=beta^2/eta*k	[75731.007, 78528.196]
Dk =beta*epsilon/eta*k^2	[13059.686, 14371.053]
Fk^2/Dk=beta^3/eta*epsilon	[403250.012, 435695.769]
epsilon/beta^2	[0.000427, 0.000456]
k/beta	[0.00237, 0.00247]
k^2/epsilon	[0.0136, 0.0151]
eta/xc	[0.387, 0.399]
beta/xc	[72.996, 76.073]
epsilon/xc^2	[2.391, 2.468]
k/xc	[0.176, 0.186]
best fit no ext hazard_MedianLifetime	[82.2, 83.2]
best fit no ext hazard_MaxLifetime	[110.0, 110.0]
best fit_MedianLifetime	[81.15, 82.15]
best fit_MaxLifetime	[109.05, 109.05]
data_MedianLifetime	[79.0, 80.0]
data_MaxLifetime	[110.0, 110.0]
ML_lnprob	[-385019.4183674486, -385019.4183674486]

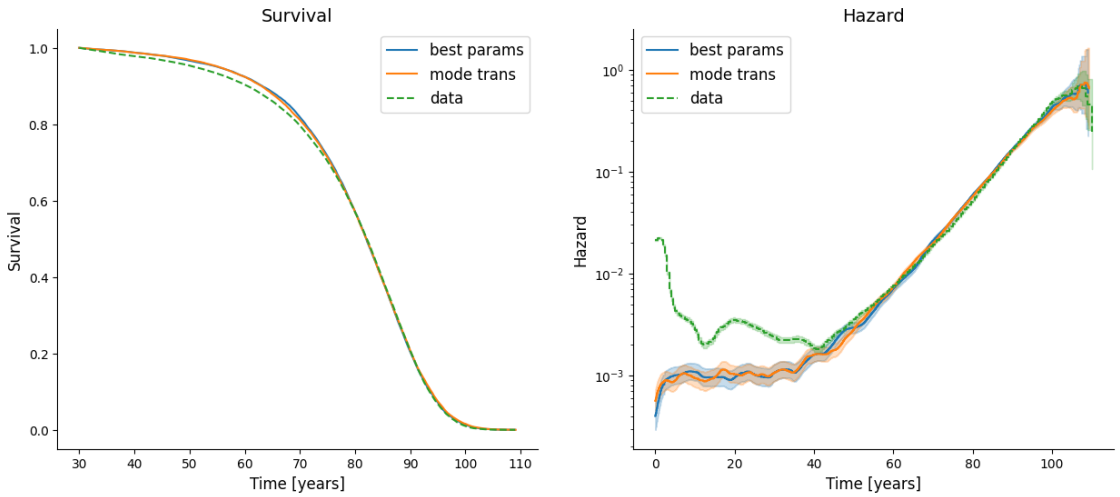
	max_likelihood	mode_overall
xc/eta	4.156	2.516
beta/eta	221.158	188.133
xc^2/epsilon	0.698	0.406
xc	1.364	2.732
ExtH	6.93	6.979
eta	0.328	1.086
beta	72.589	204.289
epsilon	2.665	18.397
sqrt(xc/eta)	2.039	1.586
s= eta^0.5*xc^1.5/epsilon	0.342	0.256
beta*xc/epsilon	37.154	30.337
eta*xc/epsilon	0.168	0.168
Fx=beta^2/eta*xc	11769.898	11769.898
Dx =beta*epsilon/eta*xc^2	316.783	316.783
Pk=beta*k/epsilon	13.62	5.552
Fk=beta^2/eta*k	32107.437	76866.925
Dk =beta*epsilon/eta*k^2	2357.371	13844.442
Fk^2/Dk=beta^3/eta*epsilon	437303.967	426779.512
epsilon/beta^2	0.000506	0.000441
k/beta	0.00689	0.00245
k^2/epsilon	0.0938	0.0136

eta/xc	0.241	0.397
beta/xc	53.219	74.776
epsilon/xc^2	1.432	2.465
k/xc	0.367	0.183
best fit no ext hazard_MedianLifetime	82.69	NaN
best fit no ext hazard_MaxLifetime	110.0	NaN
best fit_MedianLifetime	81.64	NaN
best fit_MaxLifetime	109.05	NaN
data_MedianLifetime	79.5	NaN
data_MaxLifetime	110.0	NaN
ML_lnprob	-385019.418367	-385019.418367

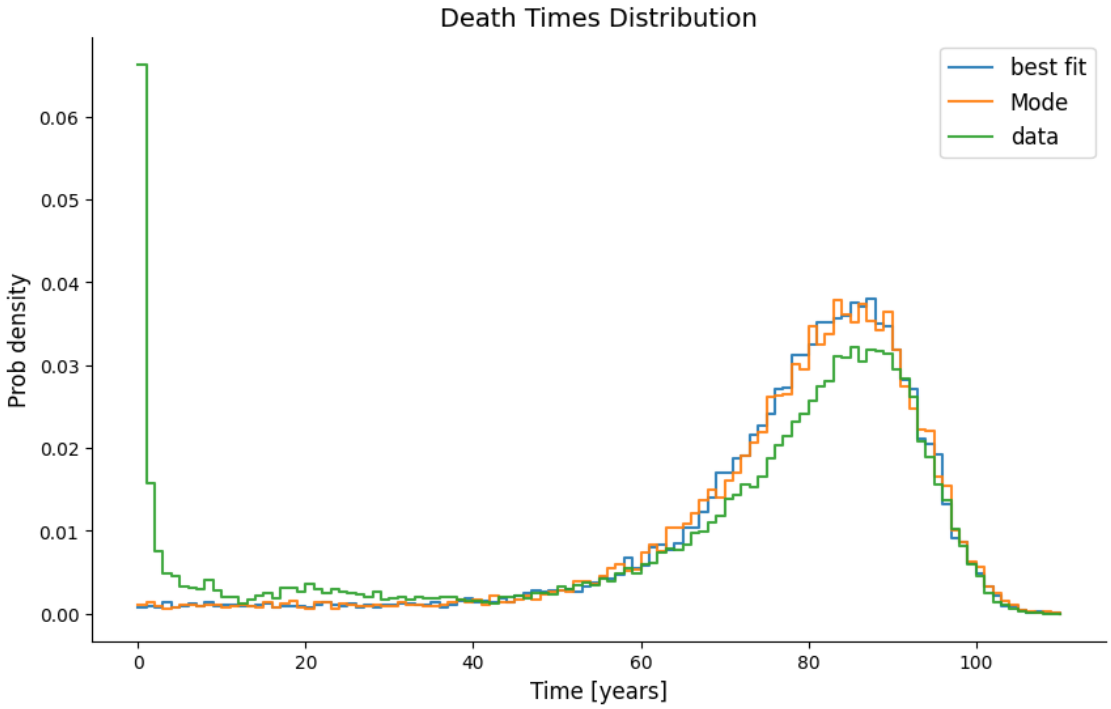
5 5. Fits of simulations to data

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
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0
20
40
60
80
100
Time [years]