Simulation Rush Report

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1   Approach

1.1   Issue faced

- A large number of s data points are close to 0

- A purely relative-error likelihood gives near-zero data points extremely small uncertainties

- Any nonzero flare model introduces oscillations in quiet regions, which are penalized more than fitting the flare peak is rewarded.

- Model converging to zero-solution instead of the true solution

1.2   Troubleshooting

- Introduce a fourth parameter, C which is a bias term in the model, so the model becomes

$$S(t) = A \cdot e^t \cdot \{1 - \tanh[2(t - \tau)]\} \cdot \sin(\omega t) + C$$

- We did this in order to allow the model to better capture the variance of the data set

- Every s data point was manually shifted up by 300 (the lower bound of the data points)

- The model was then fit for the four parameters (A, ω, τ, C). The value of C can straight-away be discarded the remaining three parameters give the best fit values

2 Plots

All the required plots- shifted data, trace plots and posterior distributions are plotted.
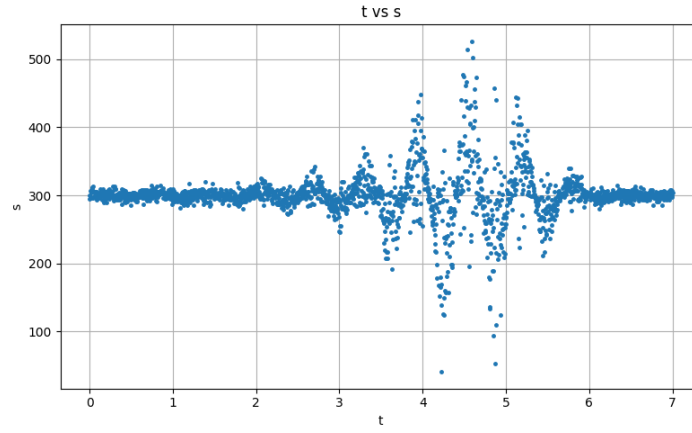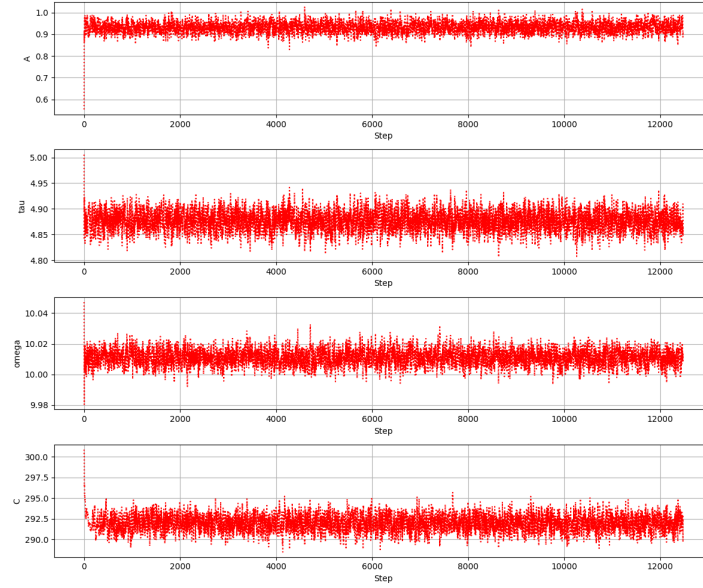

Figure 1: Shifted Data

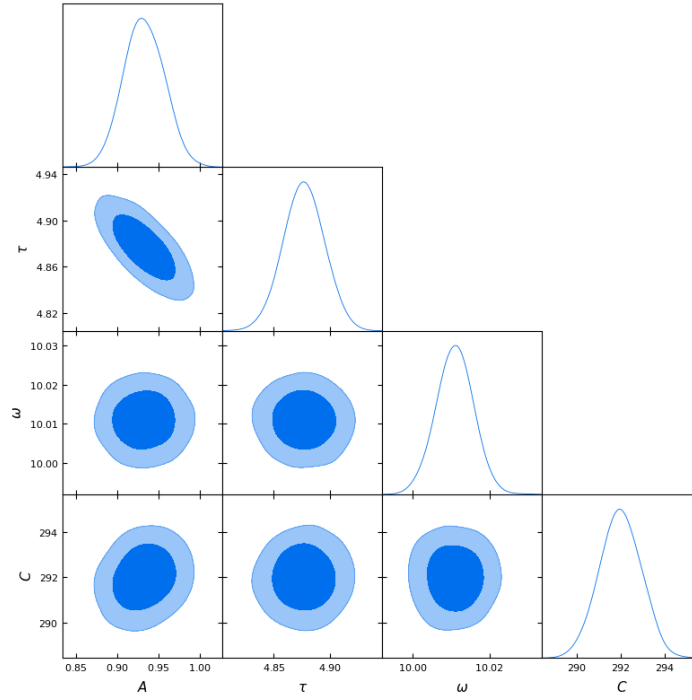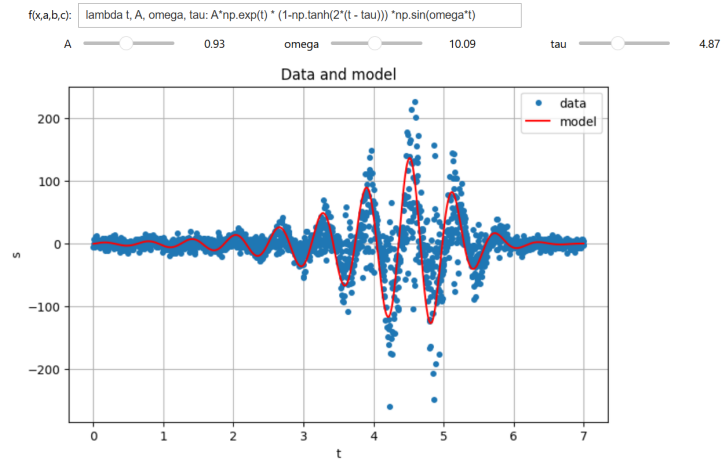Figure 2: Trace plots for all parameters

Figure 3: Posterior

Figure 4: Best fit parameters on the given (unshifted) data

3   Source Code

Source code, along with plots can be found in the Google Drive folder here
or the GitHub Repo here.

4   Result

Best Fit parameters:

1. $A = 0.9027276$

2. $\tau = 4.864592$

3. $\omega = 10.013496$