

# **Inter-arrival times and MDA**

--The Quakers (Q)

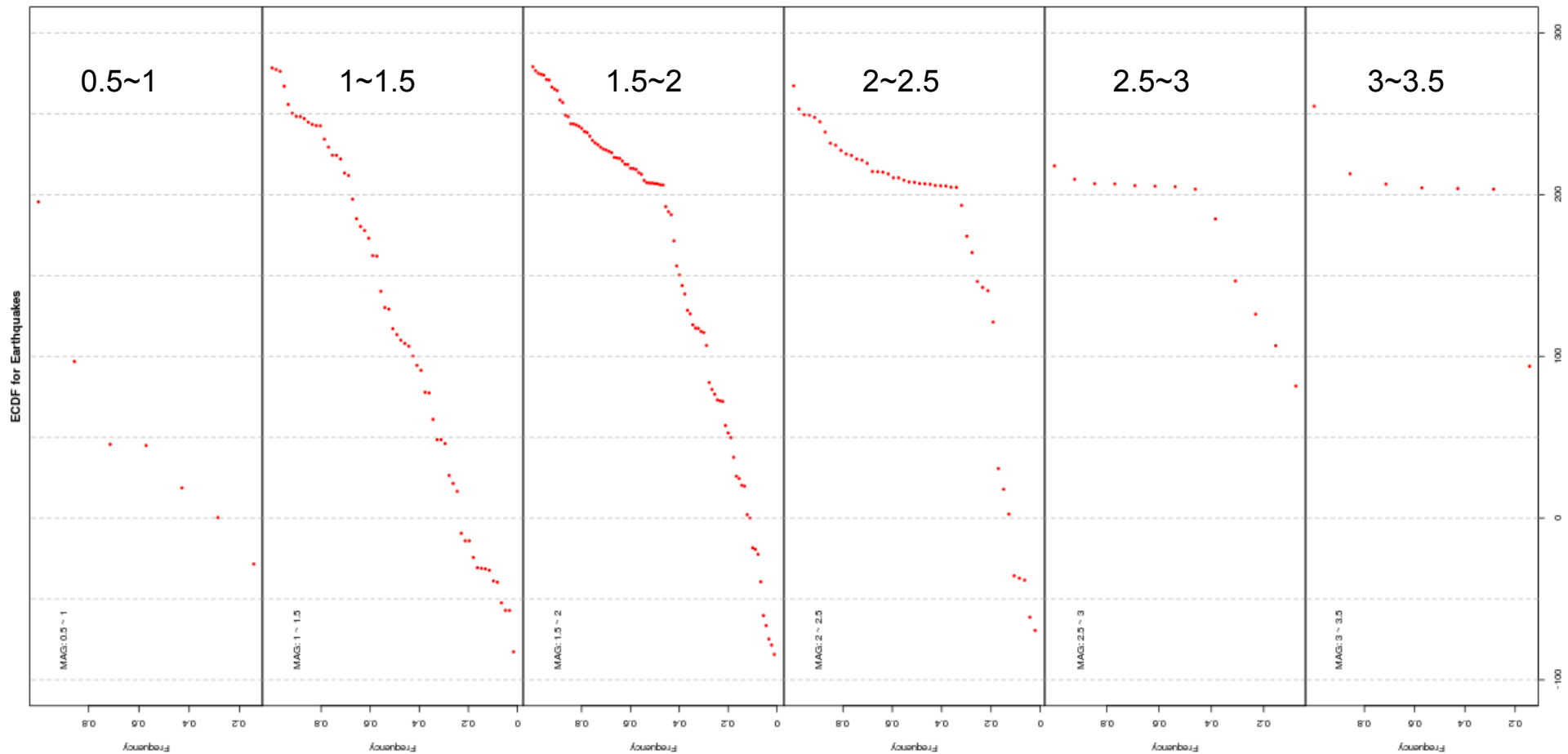
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# ECDF's of inter-arrival times

As [Prof. Stark suggested](#), we plot the empirical CDF of inter-arrival times in each range of magnitudes.

--bin the catalog into magnitude ranges of 0.5

--our code for plotting the ECDF's can be found in our repo:  
[ecdf.R](#)

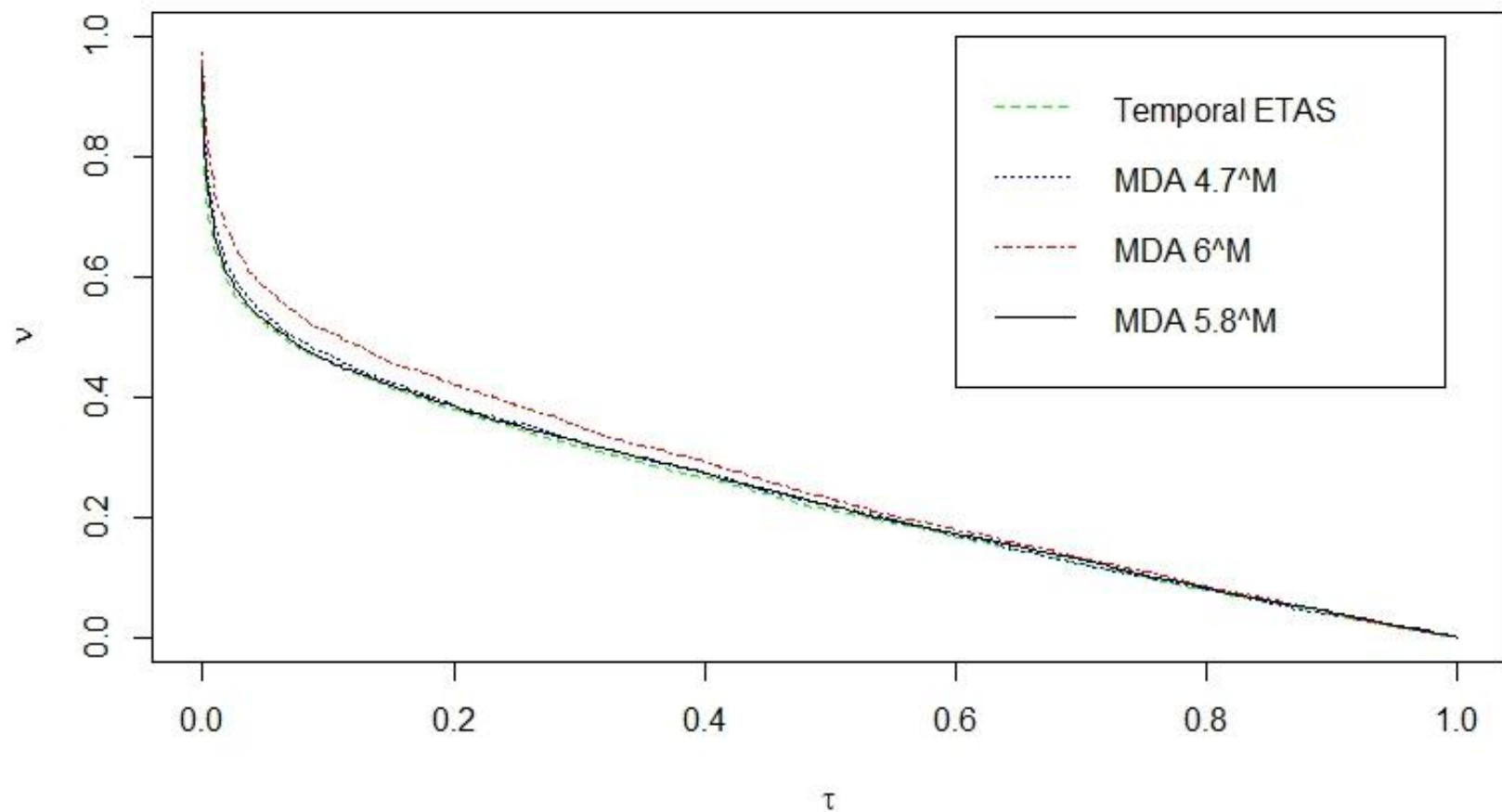


Can find it in our repo: [plot.png](#)

# Luen's code and MDA

- \* Our group also studied the [codes](#) provided by Prof. Luen on how he compared the models with their error diagrams.
- We focused on his MDA models and tried with different parameters of window-function:  $u^M$ , using his data set 'social.txt'.

## Error Diagrams of the Models

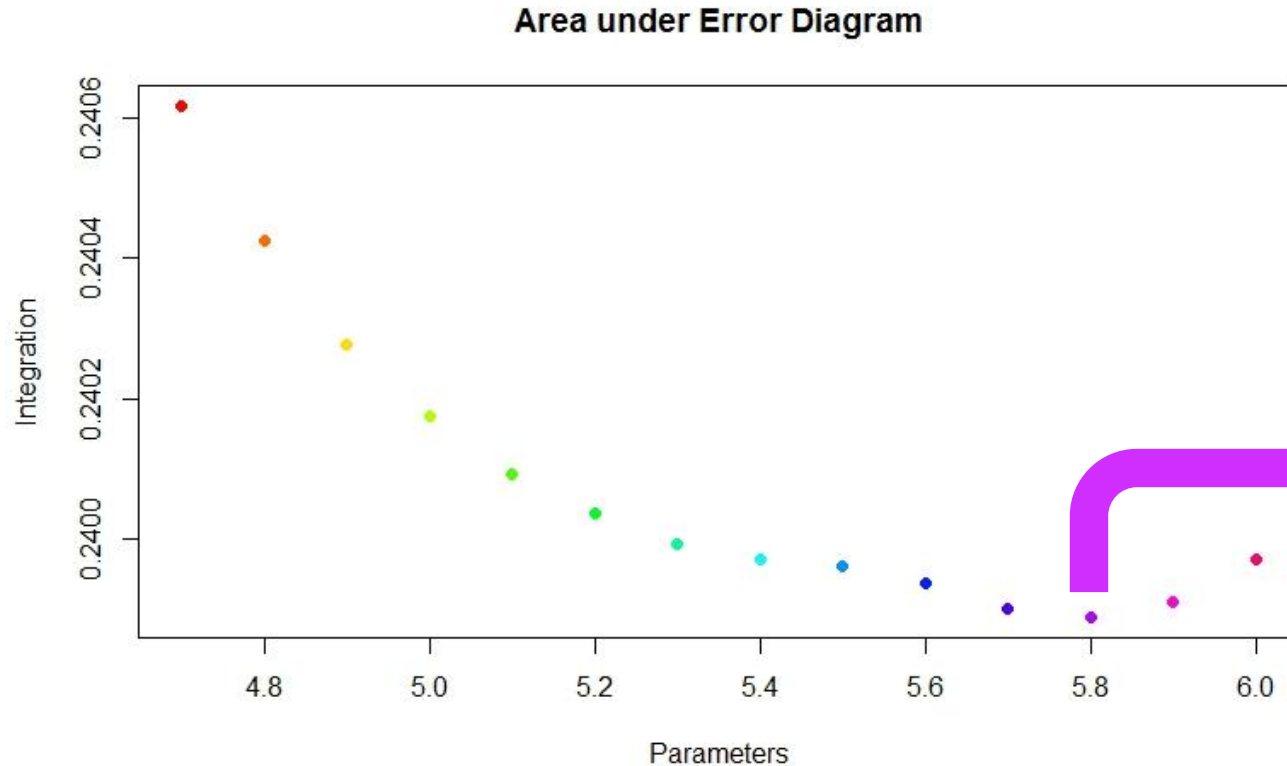


To compare the performance of the models, we thought of comparing the area under each line:

Models	Integration
Temporal ETAS	0.2349823
MDA 4.7^M	0.2409506
MDA 5.8^M	0.2401941
MDA 6^M	0.2590528

\*\*Luen's data has 8094 earthquakes, plotting the error diagram and computing these integrals took 2min. :)

To be more precise, we tried with parameters of values 4.7 to 6 separated by 0.1:



Tuning these parameters and computing the integrals took 2min.

Yes, 5.8 gives the minimum value of the integral.

## We tested with window functions:

- \* We then tried to reproduce Luen's process with our data (the [250.csv](#)):

- unsure about how he set his parameters for ETAS;

- so we only tested his MDA codes

- \* Similar plots can be drawn, though not as good as those visualized from Luen's data.

- (we have the set of codes for tuning the parameter uploaded to our repo: [Quakers-MDAtest250.R](#) )



## To do list:

- \* Test  $u^M$  for different  $u$ 's with the whole data set (1938-2013).
- \* Test functions other than simply  $u^M$ .