LLO EQ Mode alog Supplement

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The plots contained here are supplementary to the alog linked on this document's DCC page. They were generated using these scripts:

https://ldas-jobs.ligo-la.caltech.edu/~robert.beda/LLO_EQ/Tseries.py

https://ldas-jobs.ligo-la.caltech.edu/~robert.beda/LLO_EQ/Genned_Counting.py

The data were interpreted statistically by using a Kolmogorov-Smirnov test (scipy.stats.ks_2samp()) to determine the similarity between glitch rate distributions for various IFO configurations. P-values indicate probability that compared distributions are from a shared source distribution.

Results for Wind <= 5 m/s threshold:

- Observing mode and transition glitch rates had no significant difference: $p=0.895$
- Observing mode and EQ mode glitch rates differed significantly: $p=4.948*10^{-92}$

Results for Wind <= 2 m/s threshold:

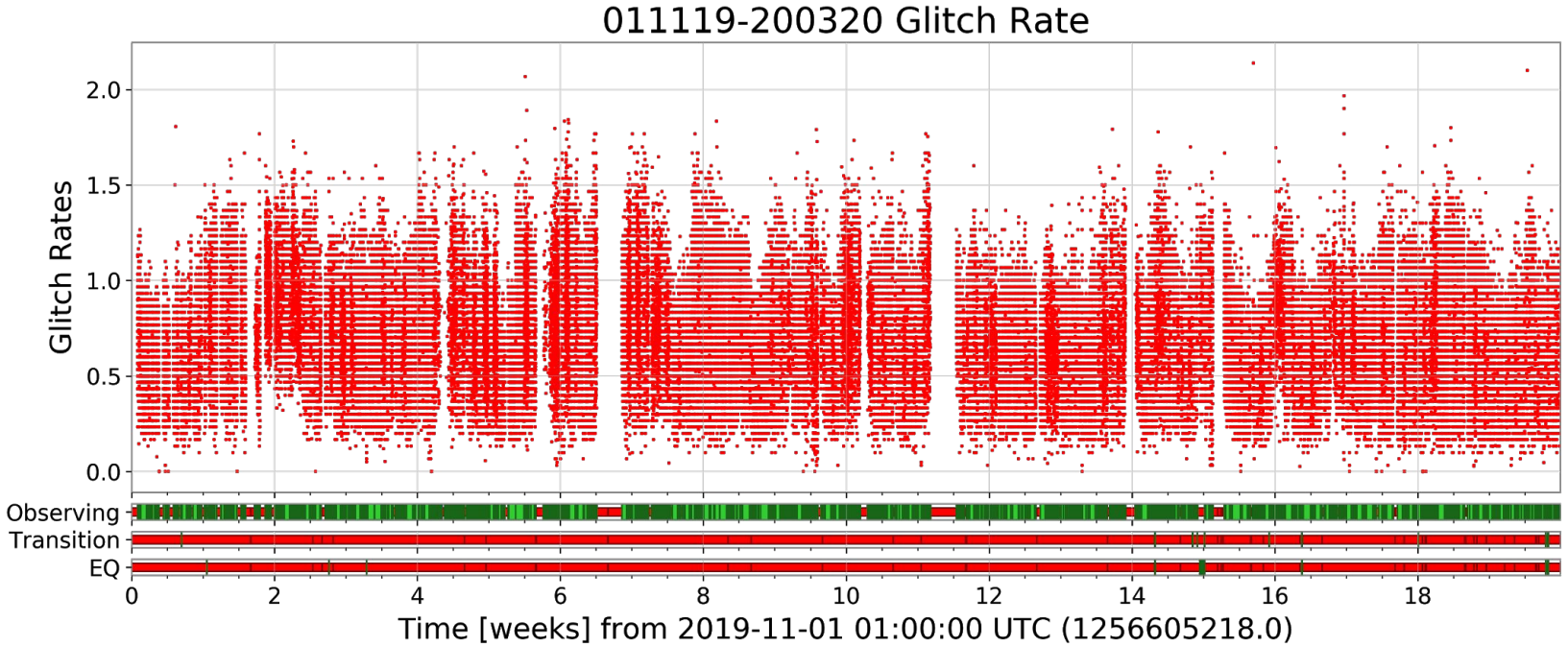
- Observing mode and transition glitch rates had no significant difference: $p=0.495$
- Observing mode and EQ mode glitch rates differed significantly: $p=2.209*10^{-58}$

A Note for Future Work

The small sample size of data from EQ transition periods makes it useful to maximize the total time analyzed. A good starting point in including more transition times might be to pull data from the O3a run and add it to the analysis. The current scripts are not well equipped to combine data from different runs, so this would require some effort.

The attached scripts are designed to be adaptable for comparison of glitch rates between a variety of detector state categories, and for a variety of environmental thresholds. More on this can be found in the comments for each script.

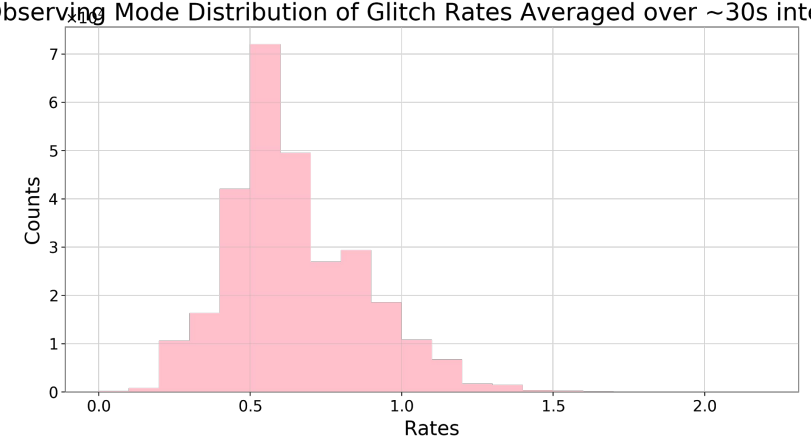
Wind <= 5 m/s


011119-200320 Glitch Rate
Glitch Rates
2.0
1.5
1.0
0.5
0.0
Observing
Transition
EQ
0
2
4
6
8
10
12
14
16
18
Time [weeks] from 2019-11-01 01:00:00 UTC (1256605218.0)

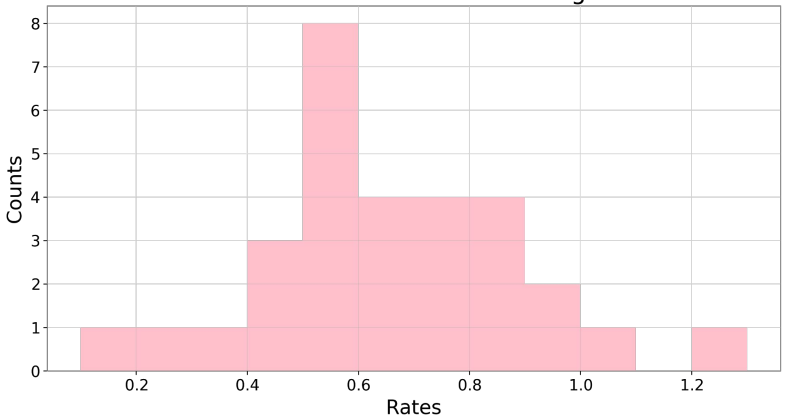
Observing vs Transition

KS test yields a p value of 0.895

Observing Mode Distribution of Glitch Rates Averaged over ~30s intervals



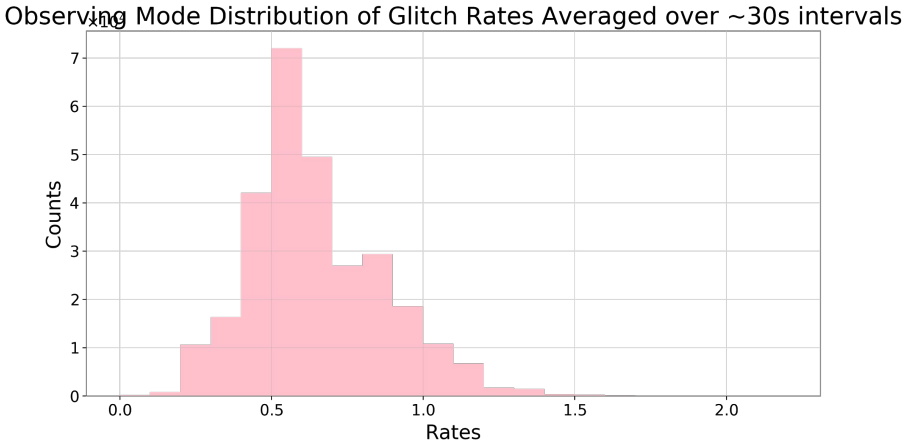
Transition Mode Distribution of Glitch Rates Averaged over ~30s intervals

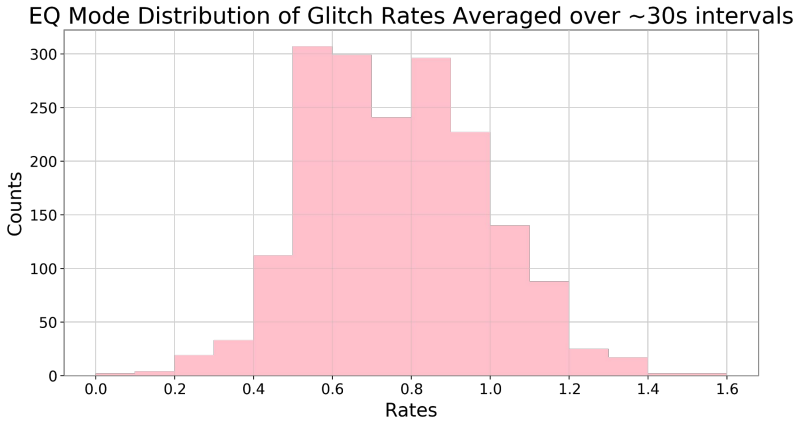


In this and all the other Observing Mode histograms in the document, the 'Counts' axis values are all multiplied by 10^4.

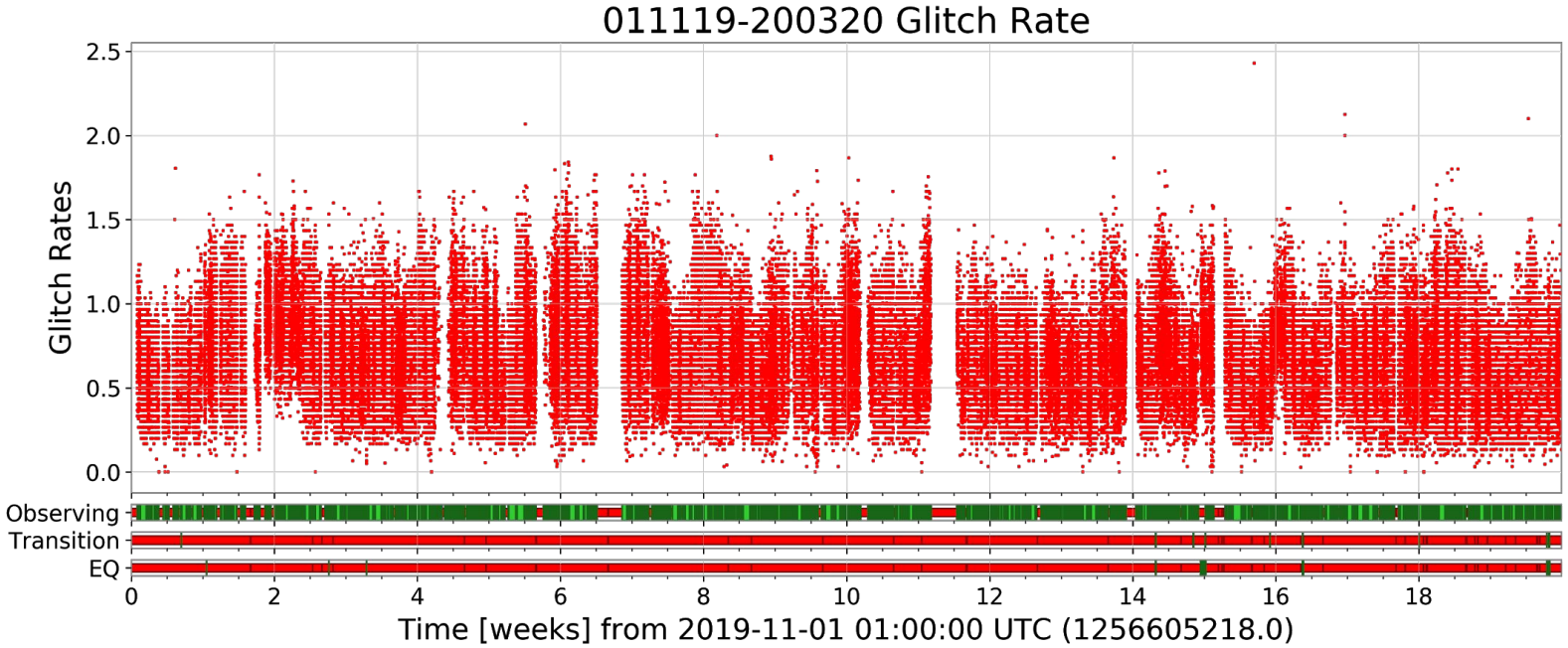
Observing vs EQ Mode

KS test yields a p value of $4.948*10^{-92}$





Wind <= 2 m/s


011119-200320 Glitch Rate
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EQ
0
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4
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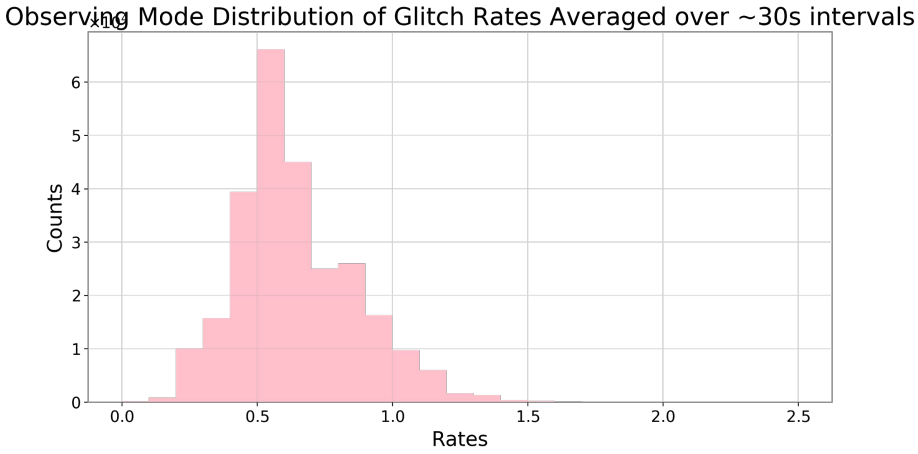
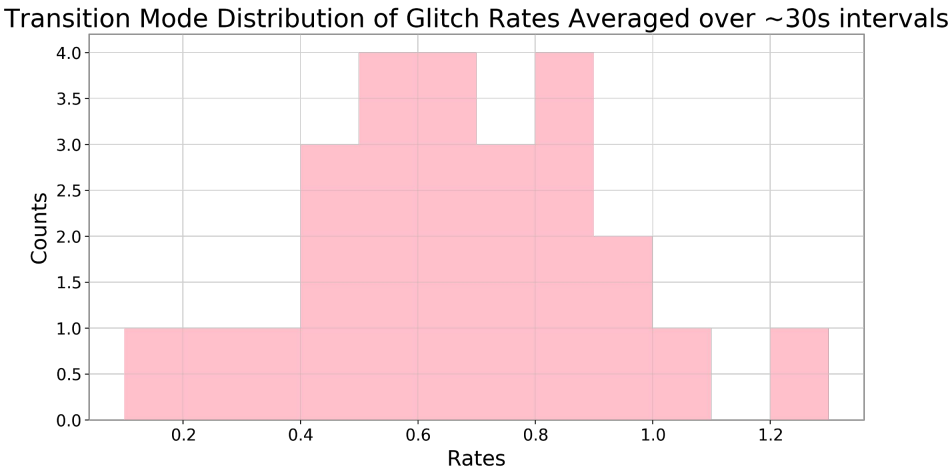
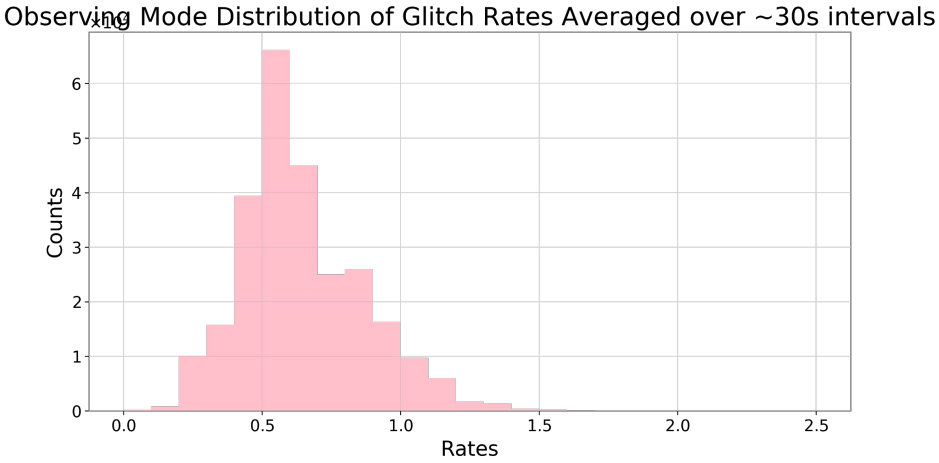
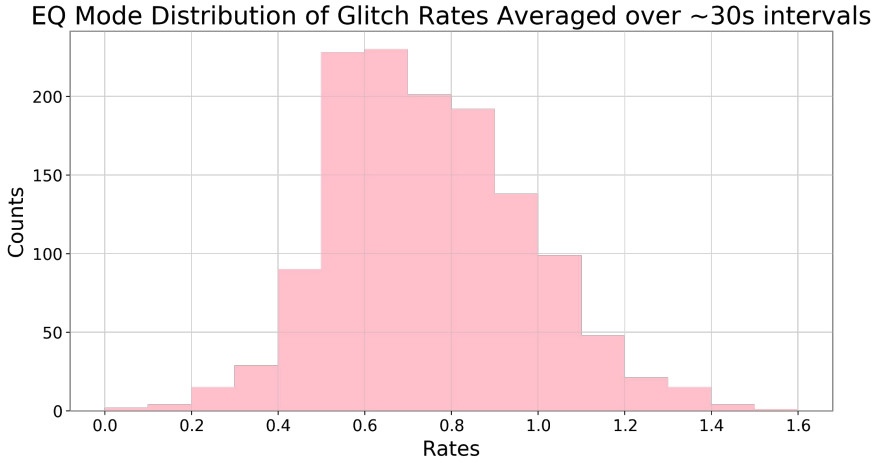
12
14
16
18
Time [weeks] from 2019-11-01 01:00:00 UTC (1256605218.0)

Observing vs Transition

KS test yields a p value of 0.495





Observing vs EQ Mode

KS test yields a p value of $2.209*10^{-58}$