

# Non-stationarity in LIGO E7 data

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Data used : E7 “Playground” data from  
Hanford 2K , GPS times 694420688-  
694421768 s. ~1080 s.

Channel analysed : H2:LSC-AS\_Q

Pre-processing : Whitened and resampled  
to 4096 Hz

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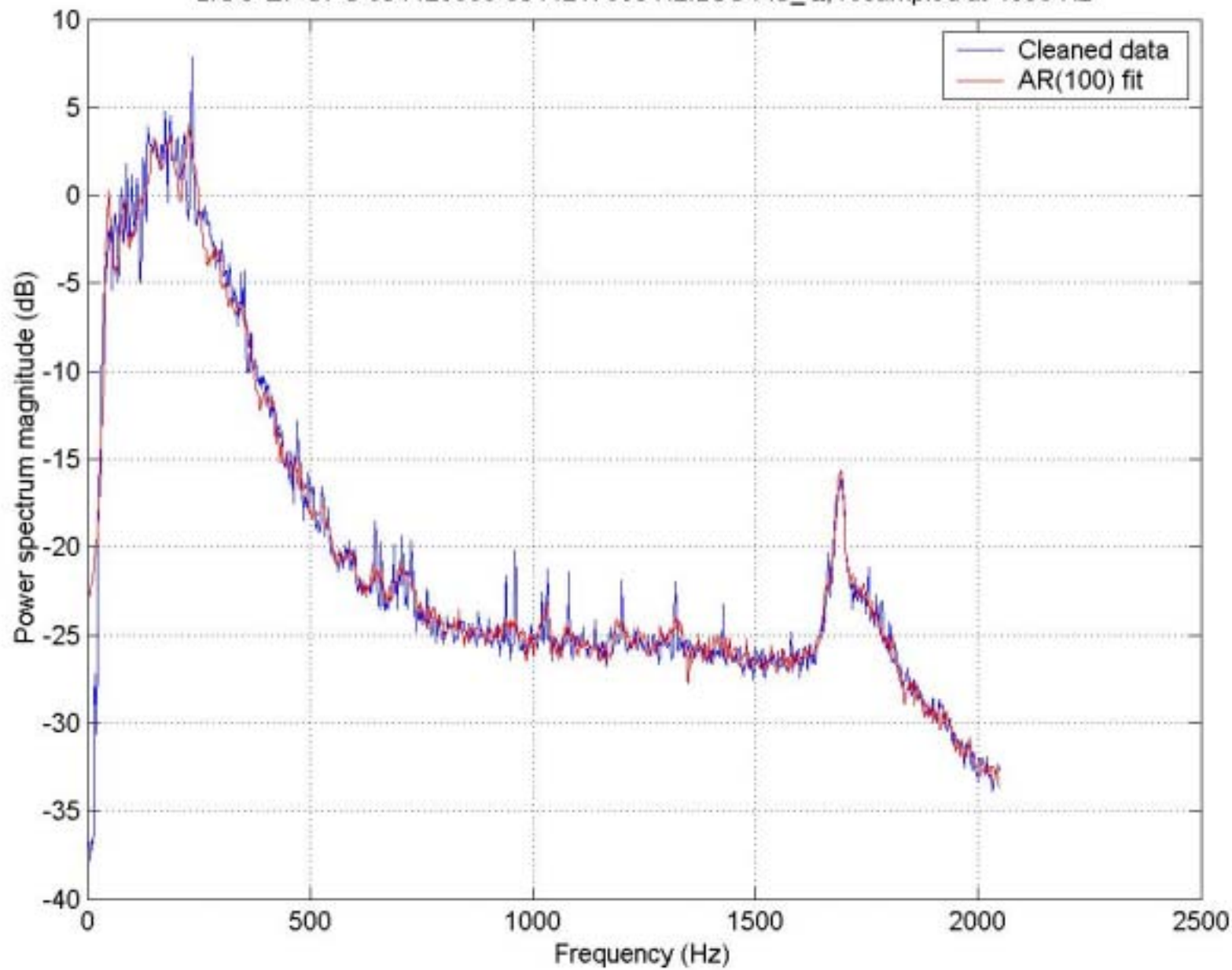
# Motivation

## Line removal and smoothing

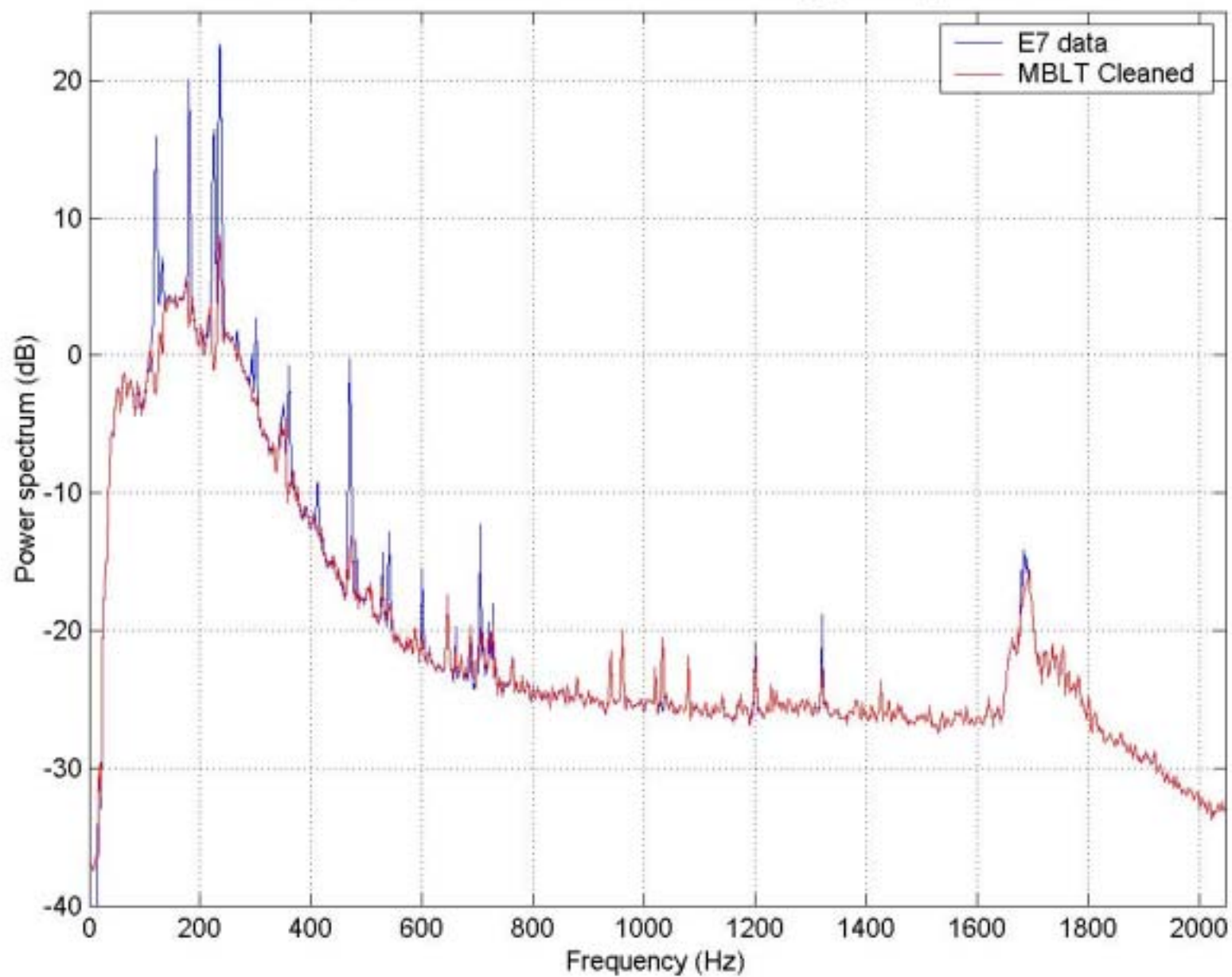
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- To look for SLOW non-stationarity
  - Cleaned by Median based line tracker (Mohanty 2002)
  - Smoothed by Running median to eliminate strong bursts
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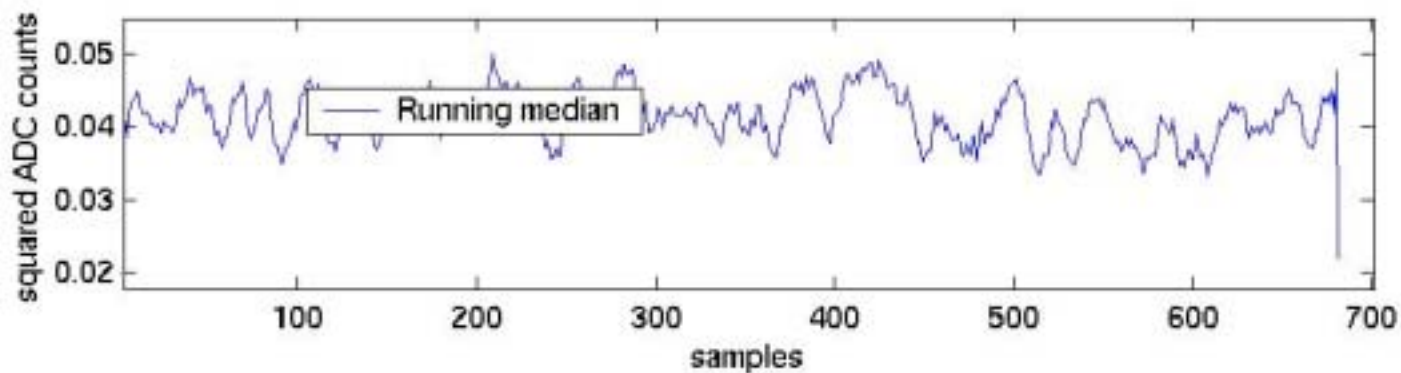
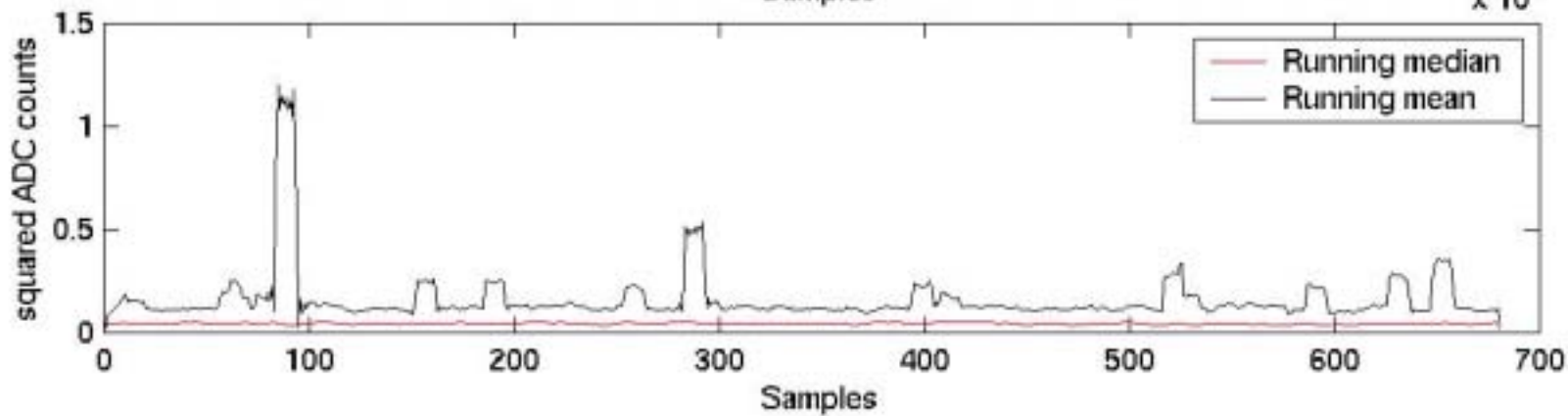
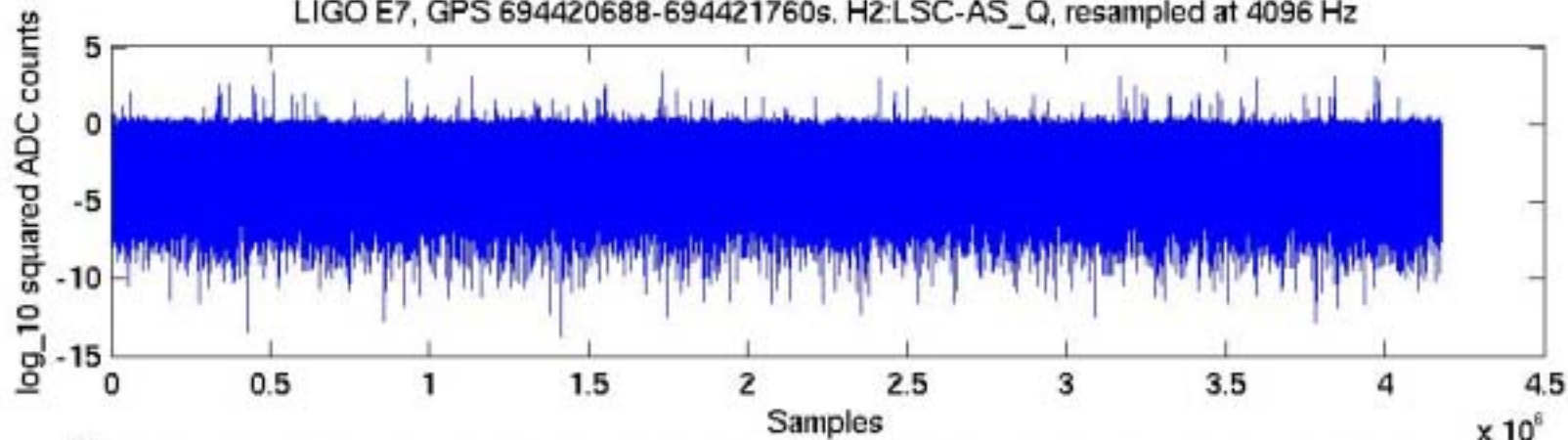
LIGO E7 GPS 694420688-694421760s H2:LSC-AS\_Q, resampled at 4096 Hz



LIGO E7 GPS 694420688-694421760s H2:LSC-AS\_Q, resampled at 4096 Hz



LIGO E7, GPS 694420688-694421760s. H2:LSC-AS\_Q, resampled at 4096 Hz



# Parametric modeling and Variogram

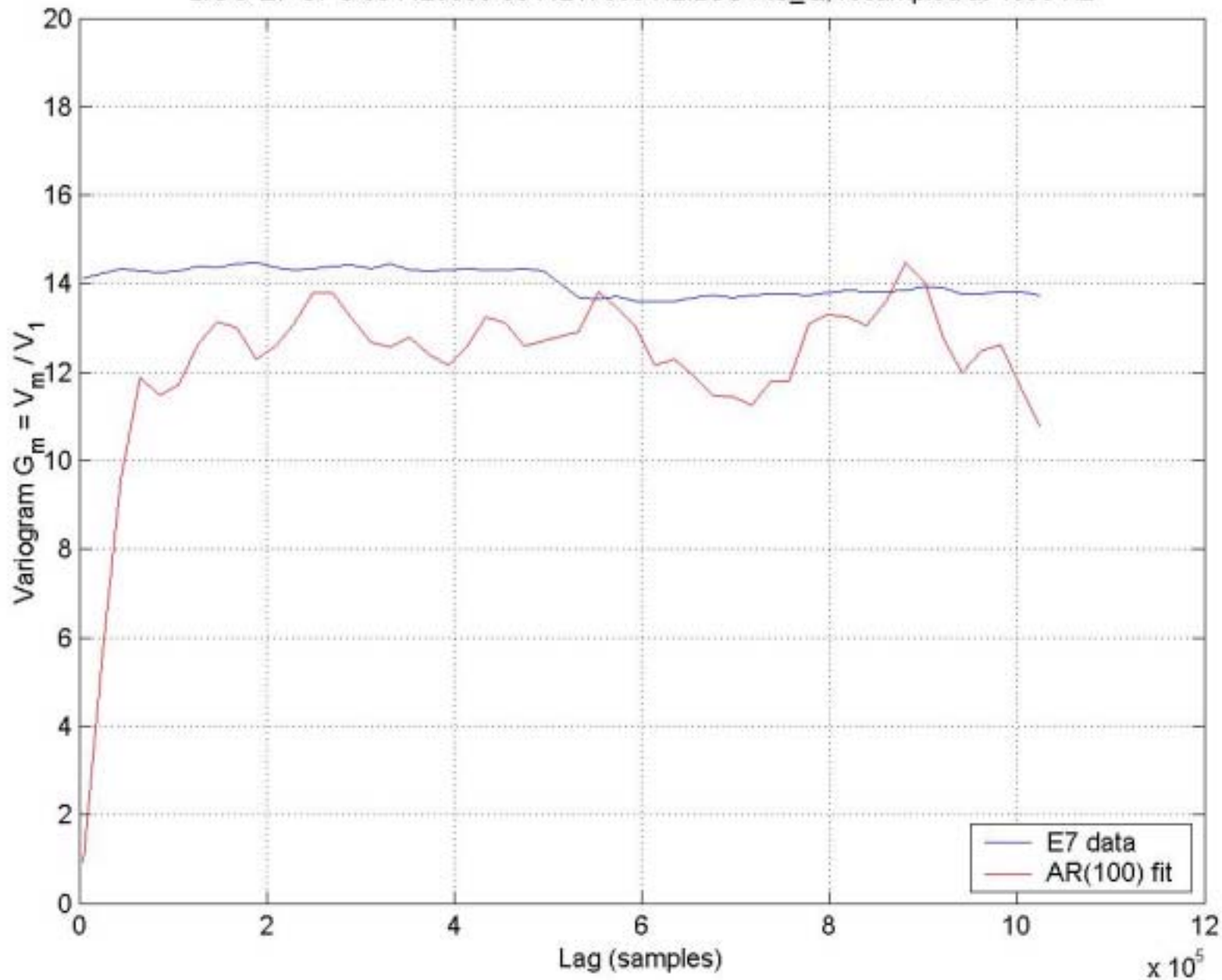
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- AR (100) model fitted to the cleaned data.
- Smoothed by running median.
- Variogram  $G(m) = V(Z(t+m) - Z(t)) / V(Z(t+1) - Z(t))$   
Computed.

[ V=variance; m=lag in terms of samples ]

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LIGO E7 GPS 694420688-694421760s H2:LSC-AS\_Q, resampled at 4096 Hz





# Conclusion and future work

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- No slow non-stationarity found in this data stretch.
  - More reliable statistical tests required to draw “quantitative” conclusions.
  - Should be tested on all of the playground data with longer lags.
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