GST Data Collection Improvements

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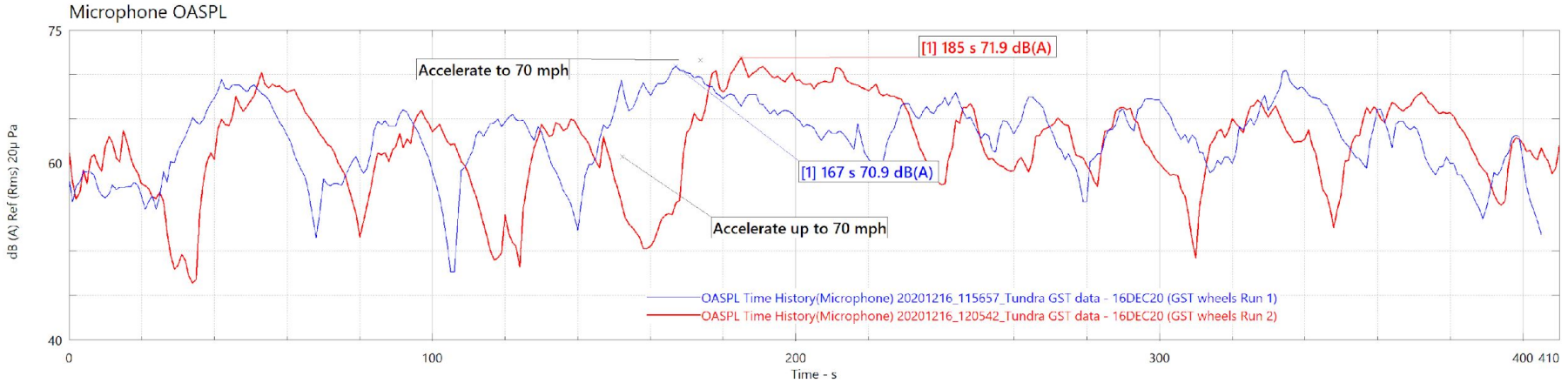
Toyota asked: **“How to best use data for decisions?”**

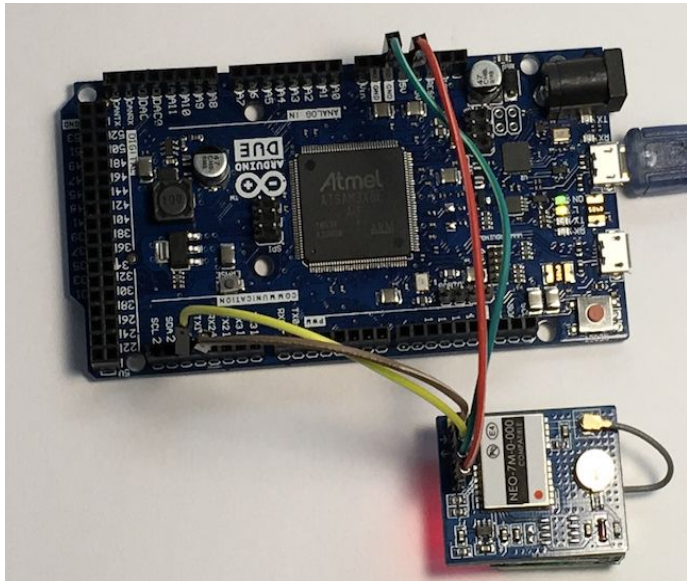
- No reference to **speed** from graphs
- No easy way to **average** multiple runs from same wheel/tire set
- Lacked any **event** reference
- Conclusion: difficult to use data to draw conclusions



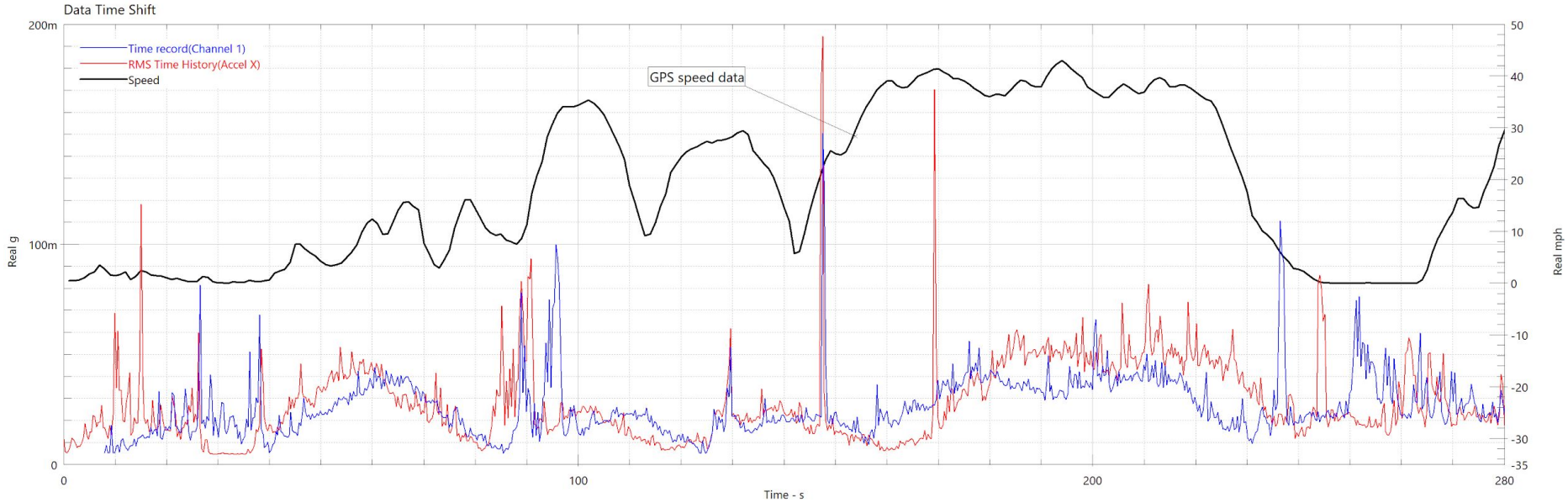
Updated features for GST data collection

1. **Capture speed from GPS.**
    a. Speed data can be *imported into analyzer* and time synchronized with other measurements like OASPL, acceleration
    b. Most low cost, NMEA compatible GPS will work
    c. GPS used here is about $50

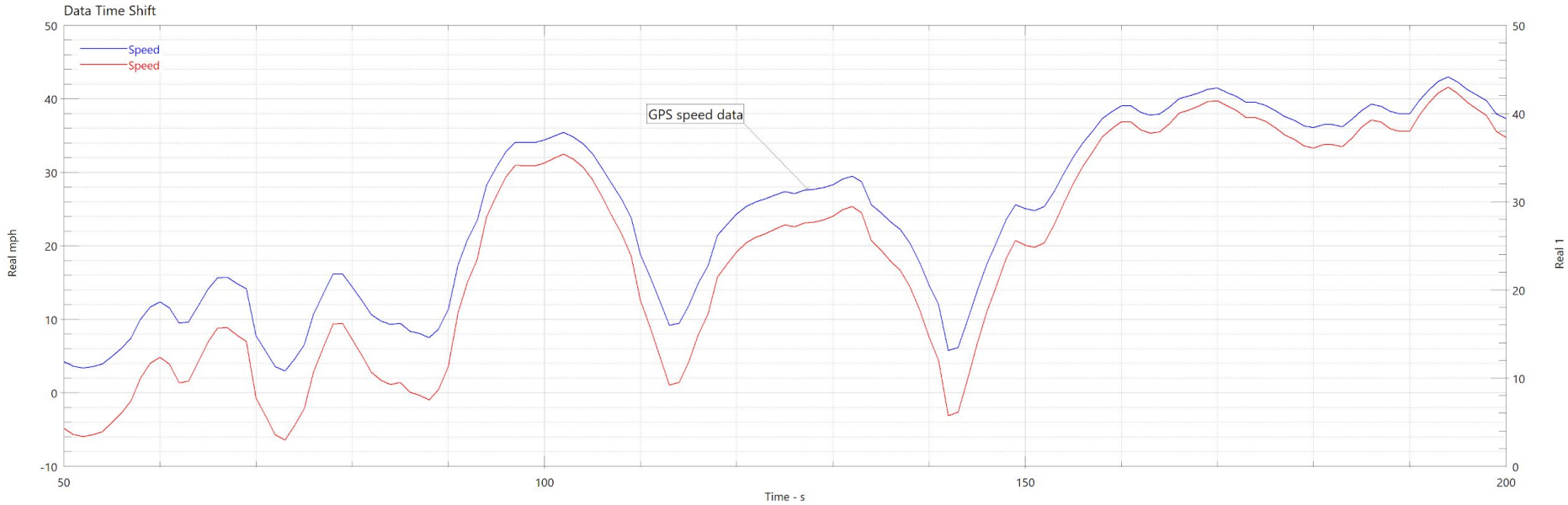
GPS hardware is powered via USB



Speed data overlayed on top of other measurements



Speed data overlayed from different runs



Updated features continued

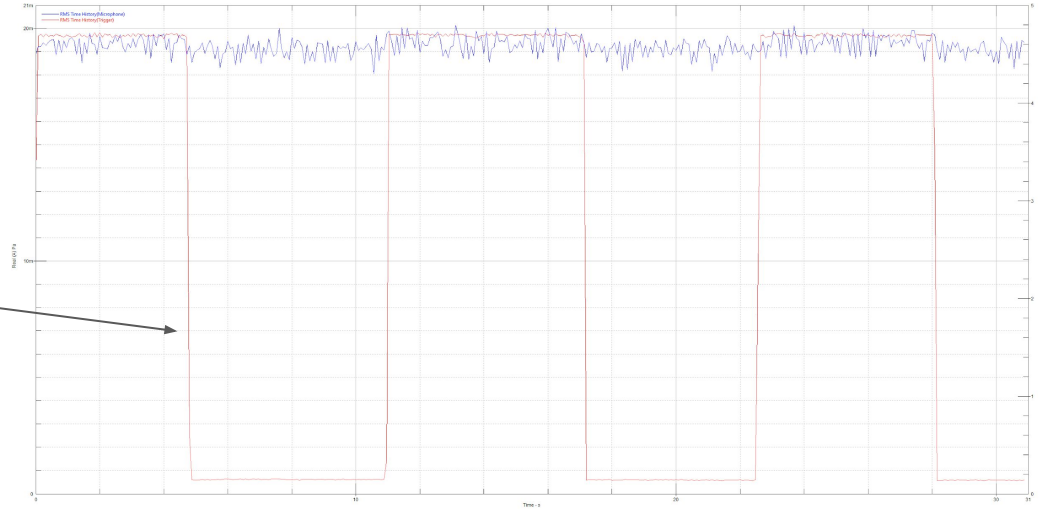
2. A pushbutton event trigger

- allows user to begin GPS and Analyzer data collection at same time
- event trigger can be used to synch measurements later

- e.g., if only data at 70mph is of interest, event triggers can be used to identify this particular section of data within an entire test run

Push button momentary switch as event trigger

~ 4V output from trigger

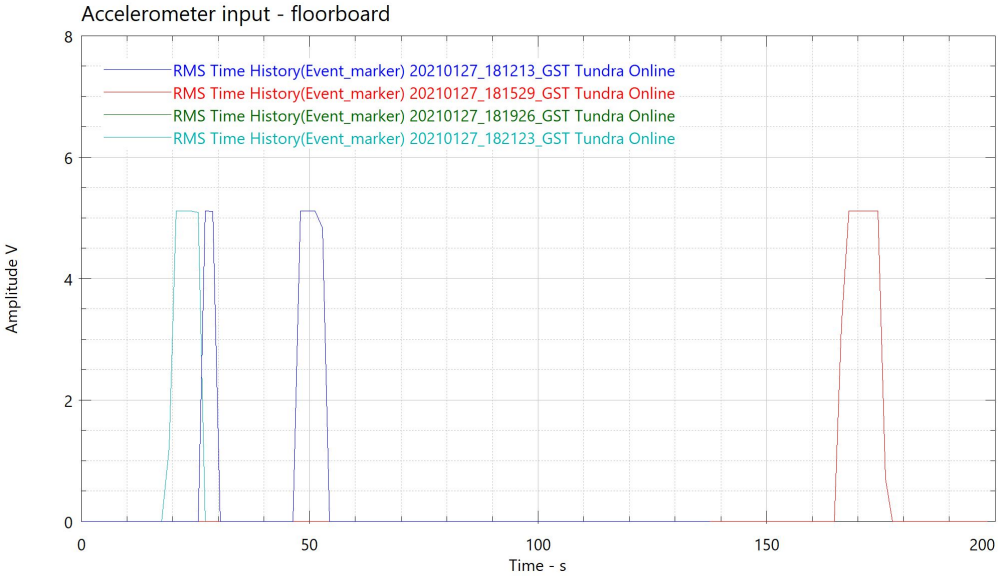


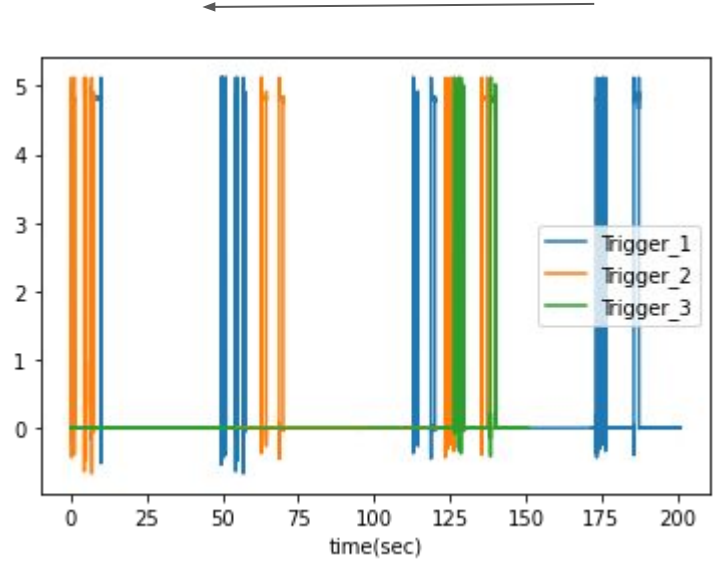
Adding event markers

- 5V event markers added
- Convenient way to align different test runs

Data can shifted in order to line up event markers

time shift



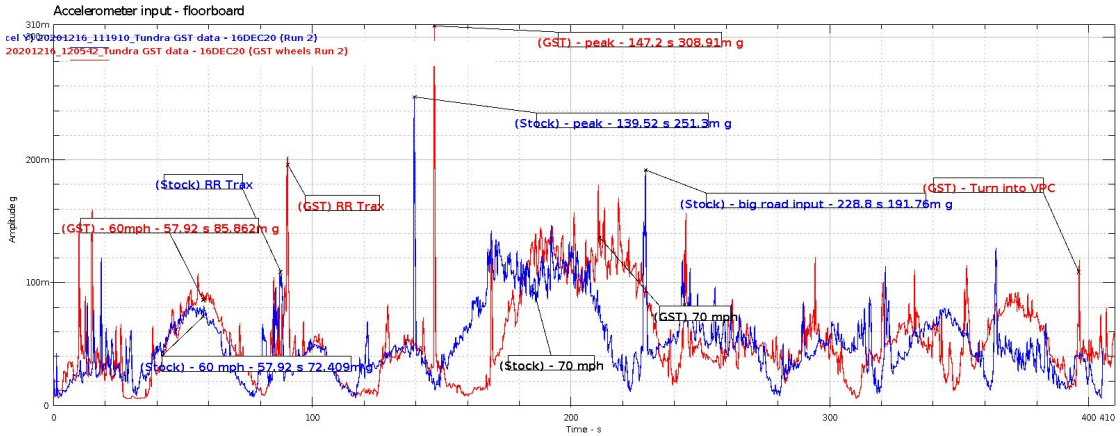


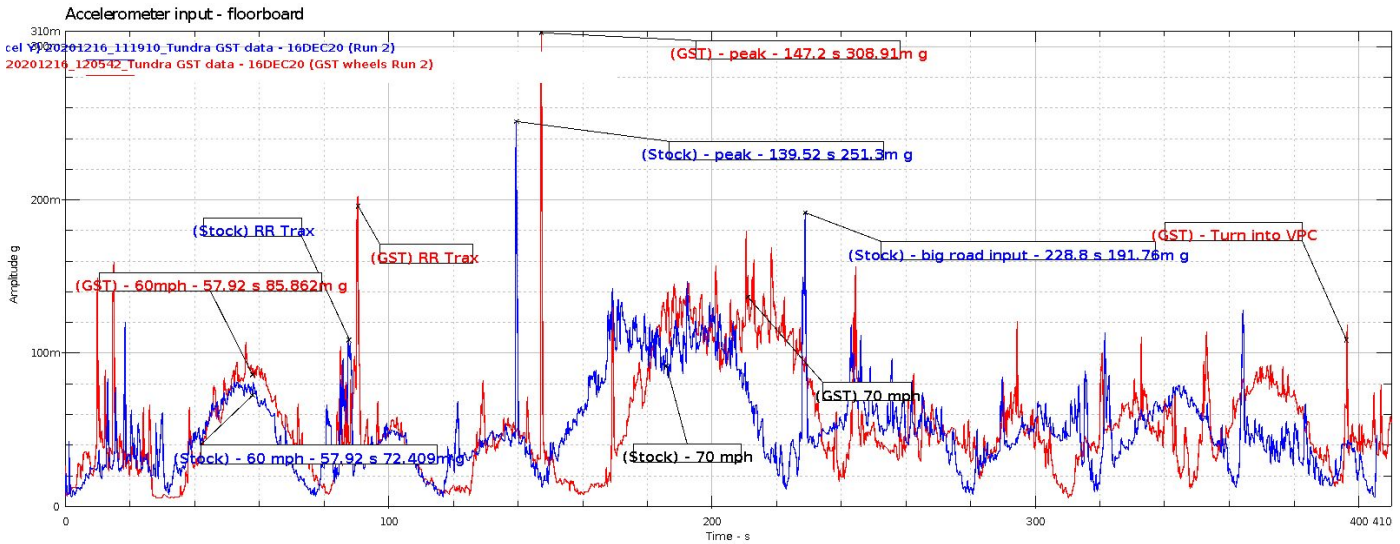
Updated features for GST data collection

3. Shift data in time

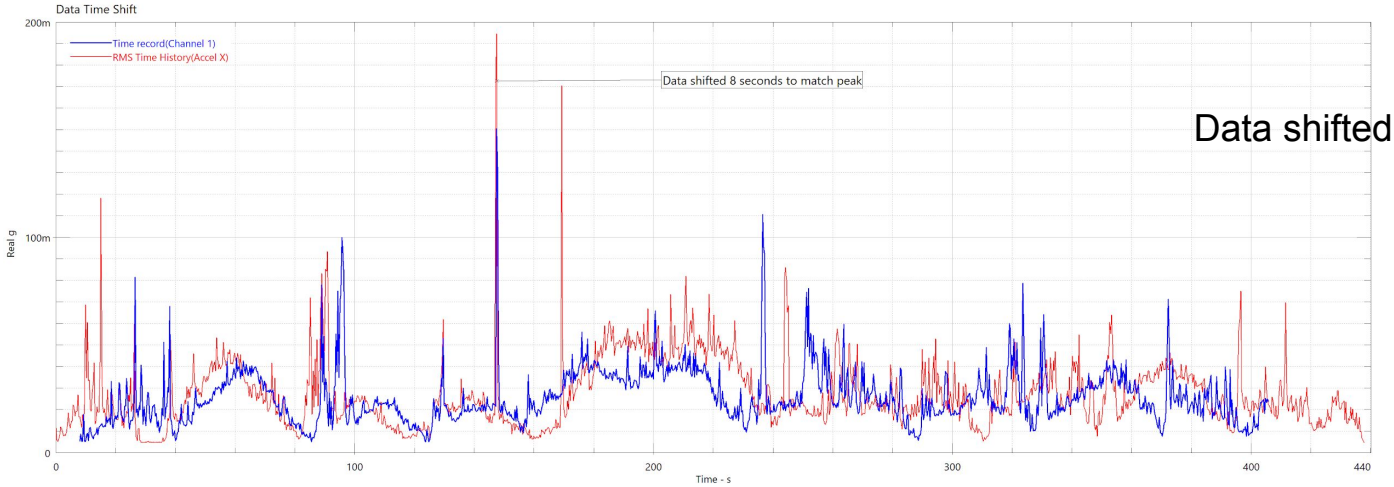
- Measurements may vary in time depending on how the data is recorded and the particular test route
- Time shifting may be useful when needing to overlay certain speed ranges in order to get a better comparison between runs

- 2 Accelerometer signatures from different test runs
  - slightly out of phase (~ 8 secs)





Original graph



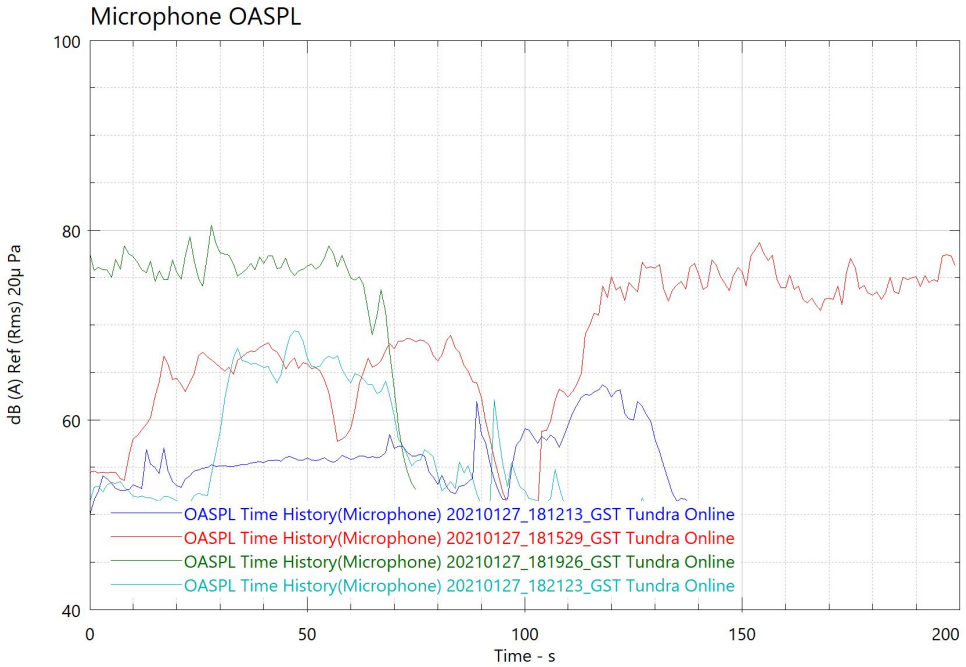
Data shifted graph

Updated features for GST data collection

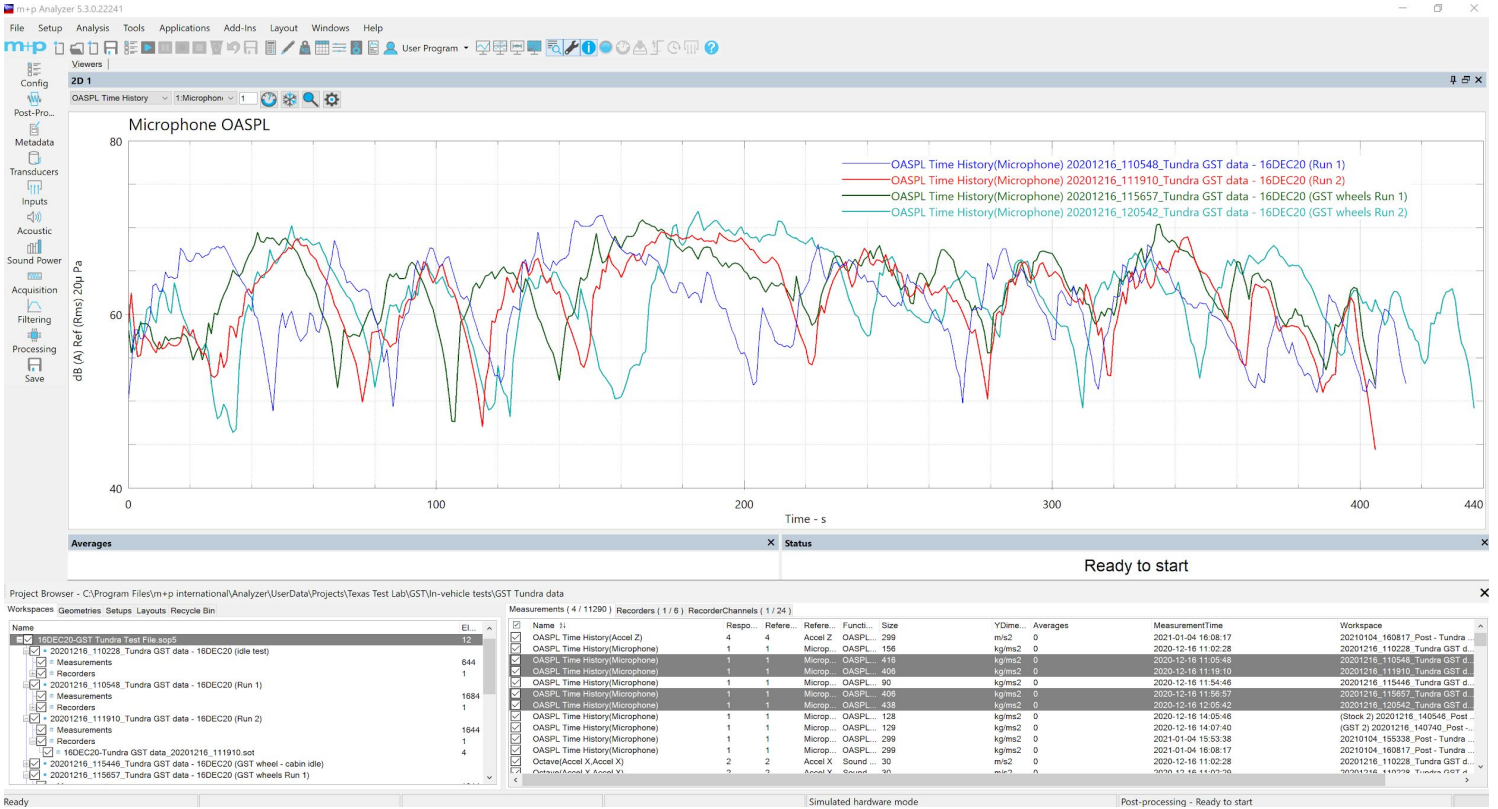
4. Average multiple measurements of different lengths

a. Measurements may vary in time depending on how the data is recorded and the particular test route

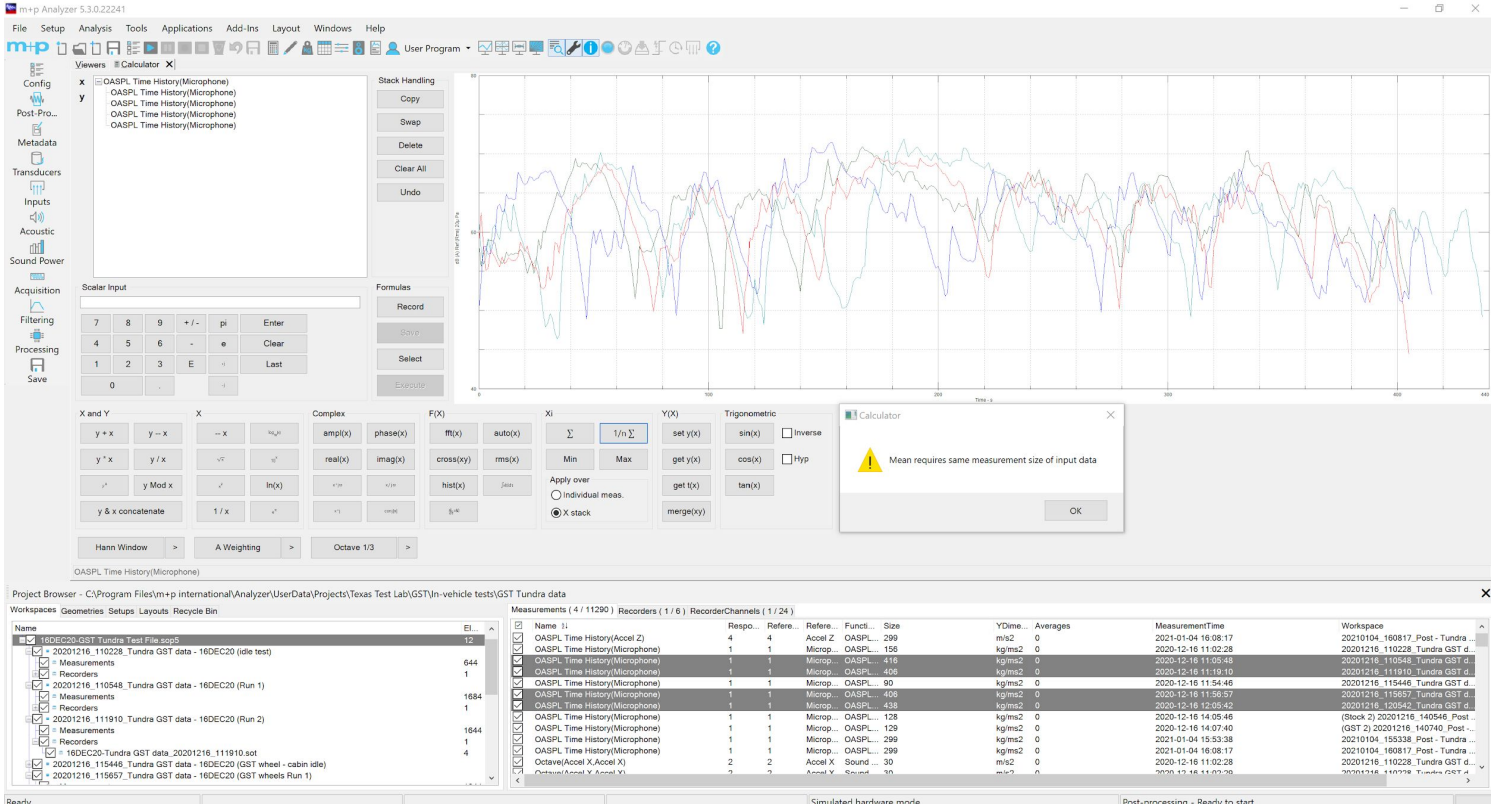
OASPL measurements of different lengths



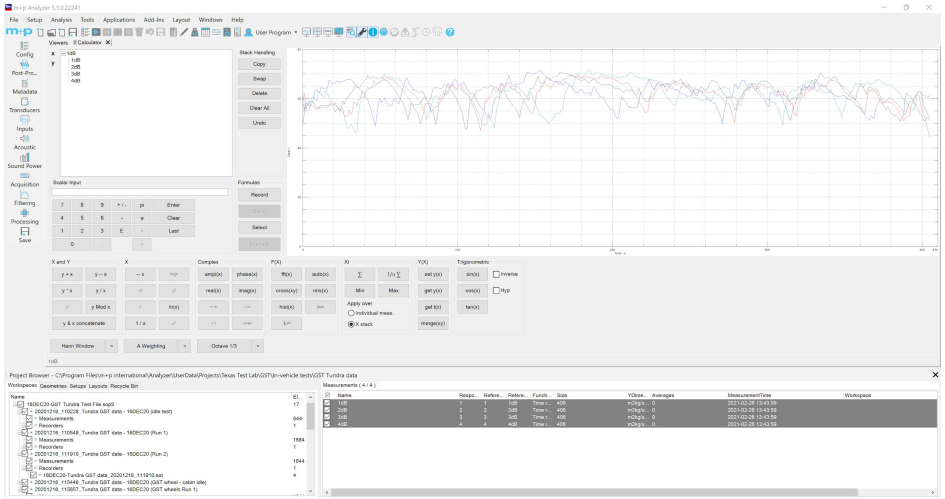
OASPL measurements - can’t average

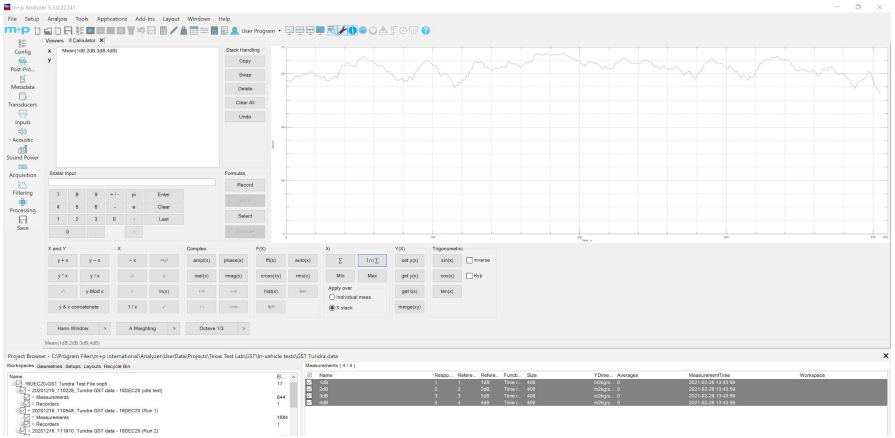


Error using calculator - only because data is different length



Export OASPL → Resizing - Import back in mpA

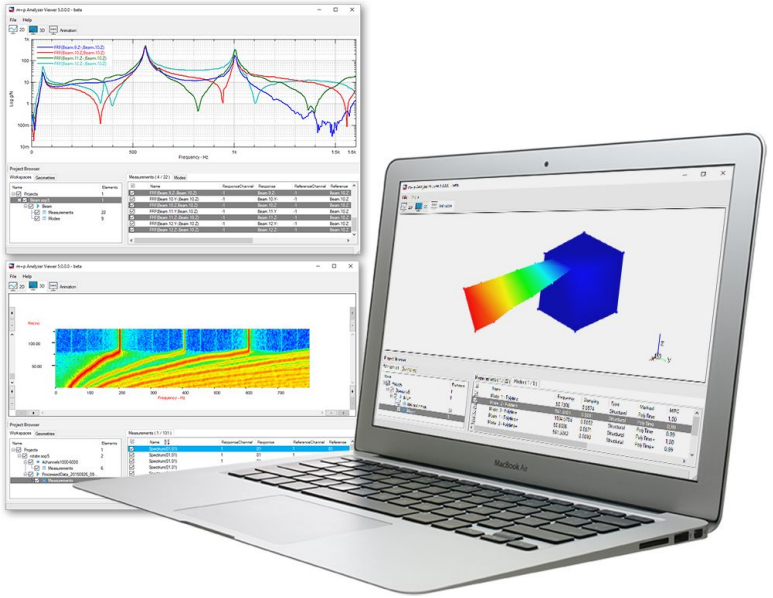




How can the data be shared within GST?

Data files can be viewed on any PC with m+p Viewer software

Common use case: Tech records .sot file → Sends to Engineer 1 → Engineer 1 post processes in Analyzer software → sends file to Engineer 2, 3, … N for them to view in Viewer



Data reporting built into Analyzer

Quickly Generate reports

15DEC20-GST Test file20201215_105658_GST Tundra Online (4th drive - punchy input)20201215

User **Gulf States Toyota**

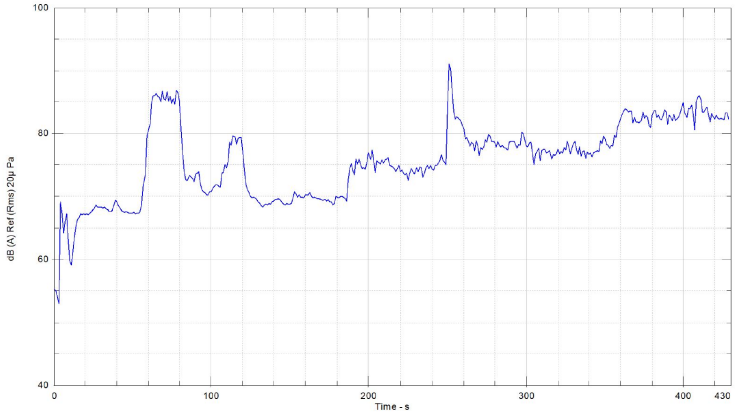
Test-ID **Tundra Eval**

15DEC20-GST Test file20201215_105658_GST Tundra Online (4th drive - punchy input)20201215

User Gulf States Toyota

20201215_105658_GST Tundra Online (4th drive - punchy input)

OASPL Time History(Microphone)



FunctionType	OASPL Time History
MeasurementTime	15-Dec-20 10:56:58 AM
Reference	Microphone
ReferenceChannel	1
Response	Microphone
ResponseChannel	1

Summary

- Data can be quickly post-processed for additional analysis in m+p Analyzer
- Speed data can easily be viewed and analyzed for reference
- Event triggers make it possible for driver to note a time of interest during the run
- Data from Analyzer can be easily shared with others using the viewer program