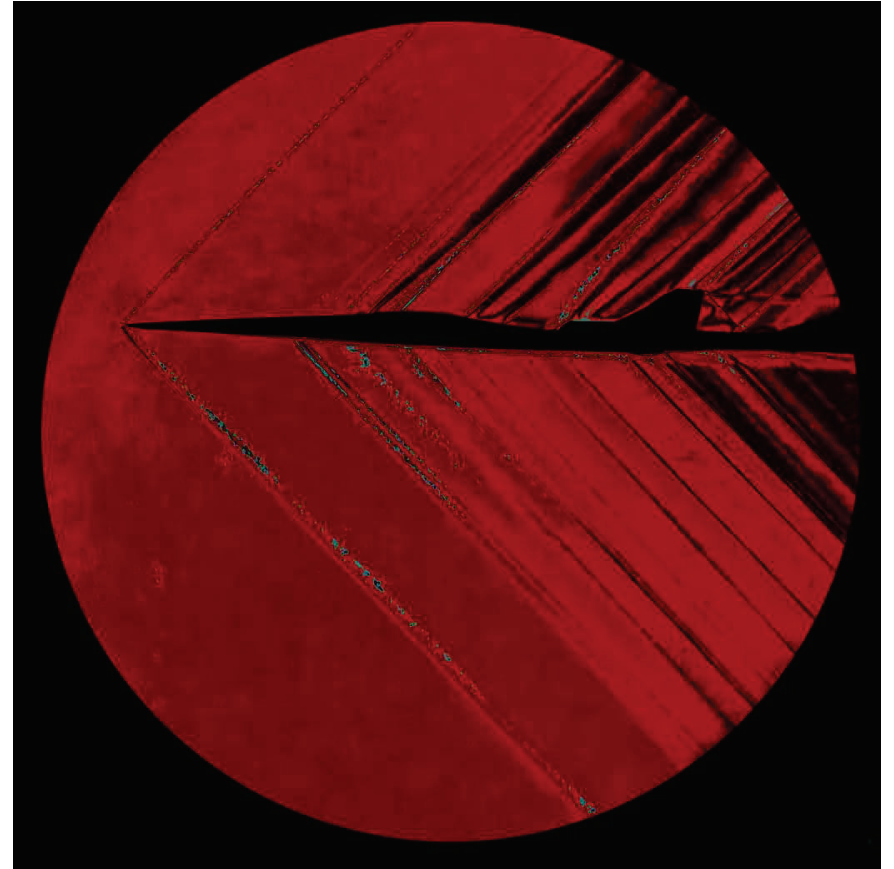
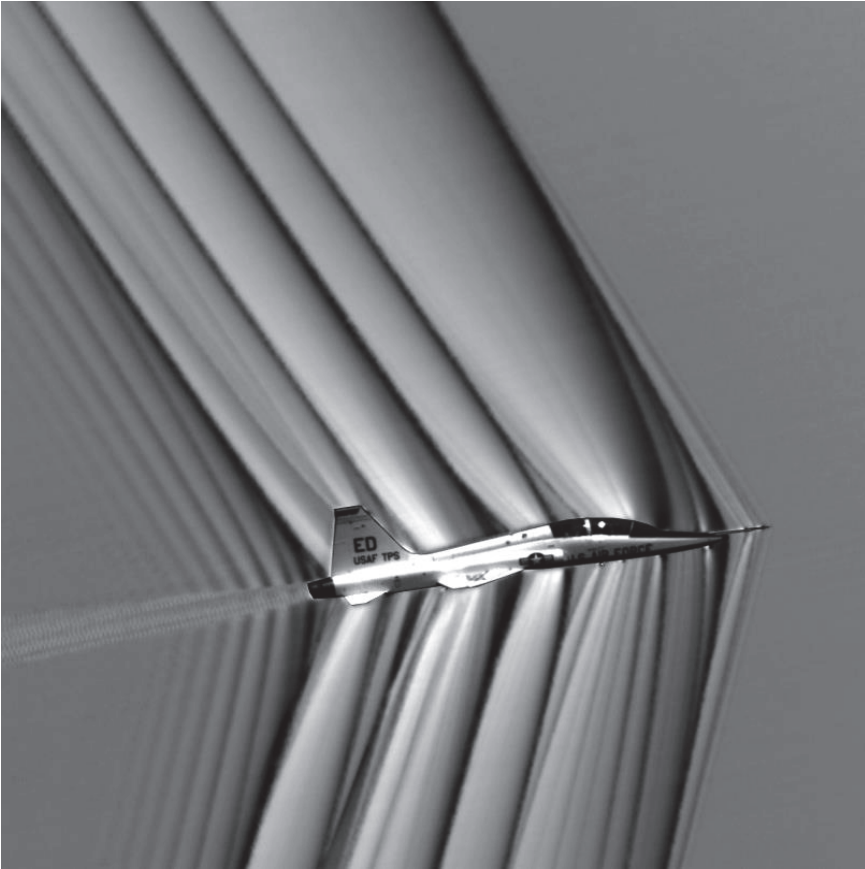


Analyzing differences between predicted and measured sonic boom metrics

Avery K. Sorrell, Sean W. Hull, Kaylee Nyborg, Mark C. Anderson, Kent L. Gee (Brigham Young University)
Alexandra Loubeau (NASA Langley Research Center)

6th Joint Meeting of the Acoustical Society of America and Acoustical Society of Japan
December 1-5, 2025

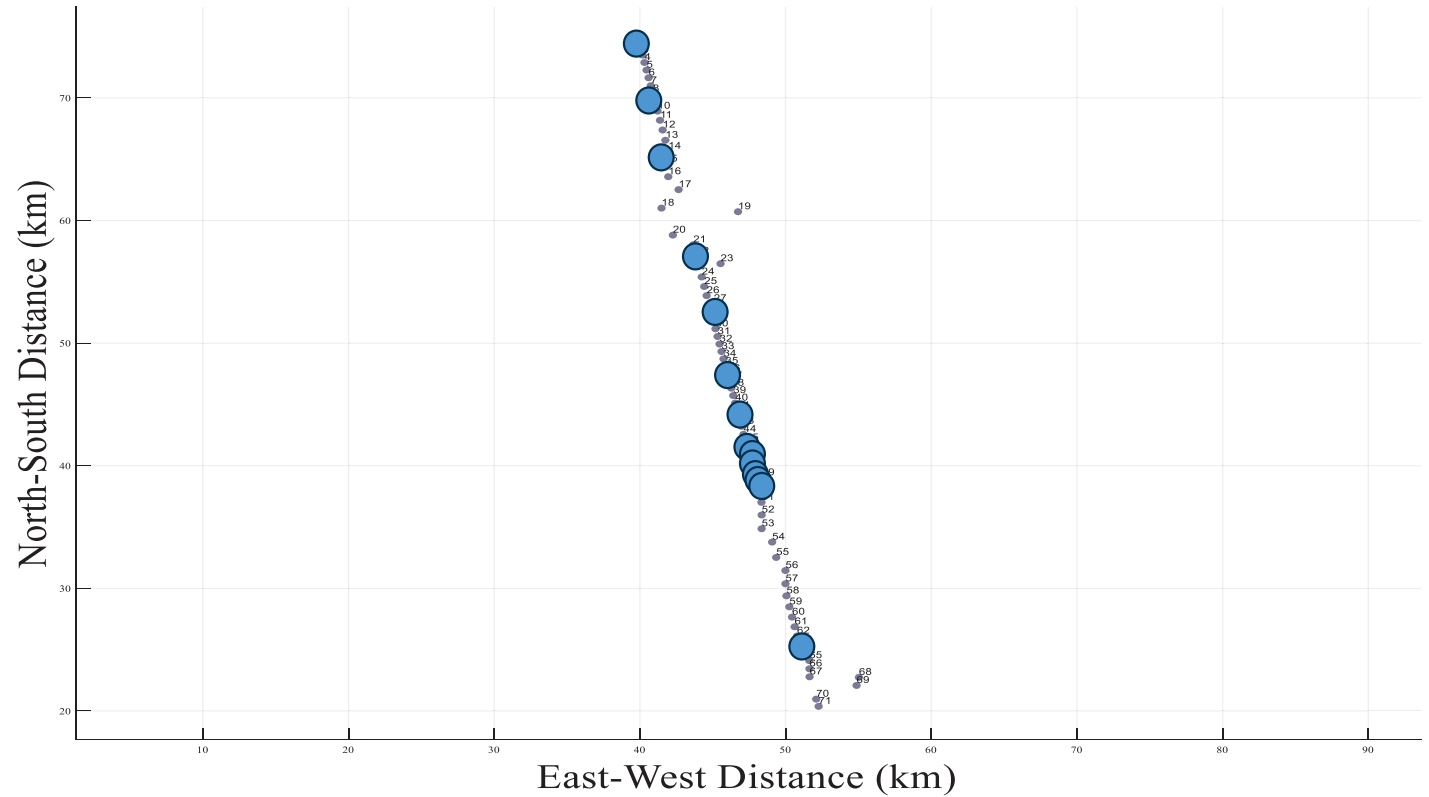
The NASA X-59 and Quiet Supersonic Flight



NASA CarpetDIEM III – Seize the Boom

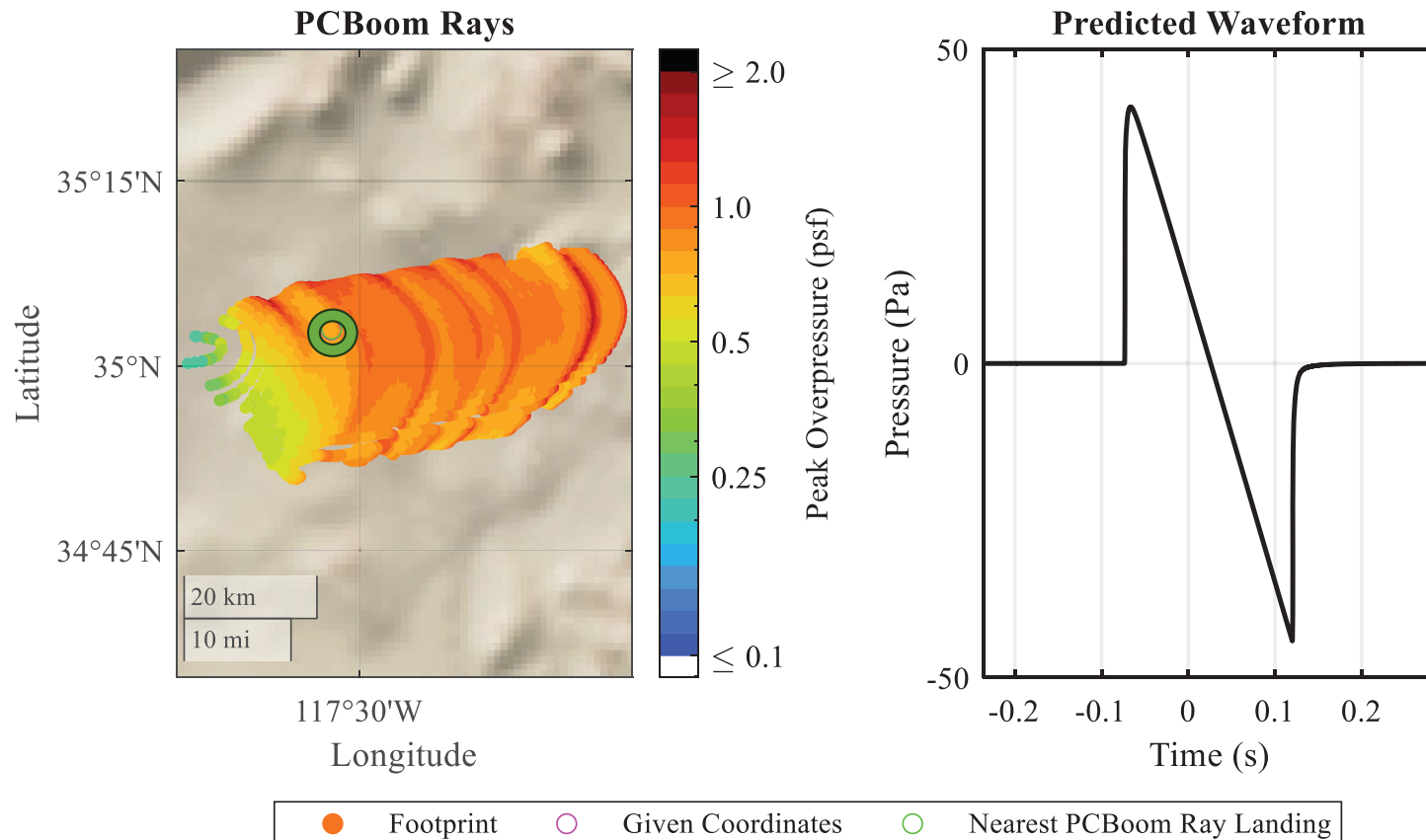


Relative Station Locations



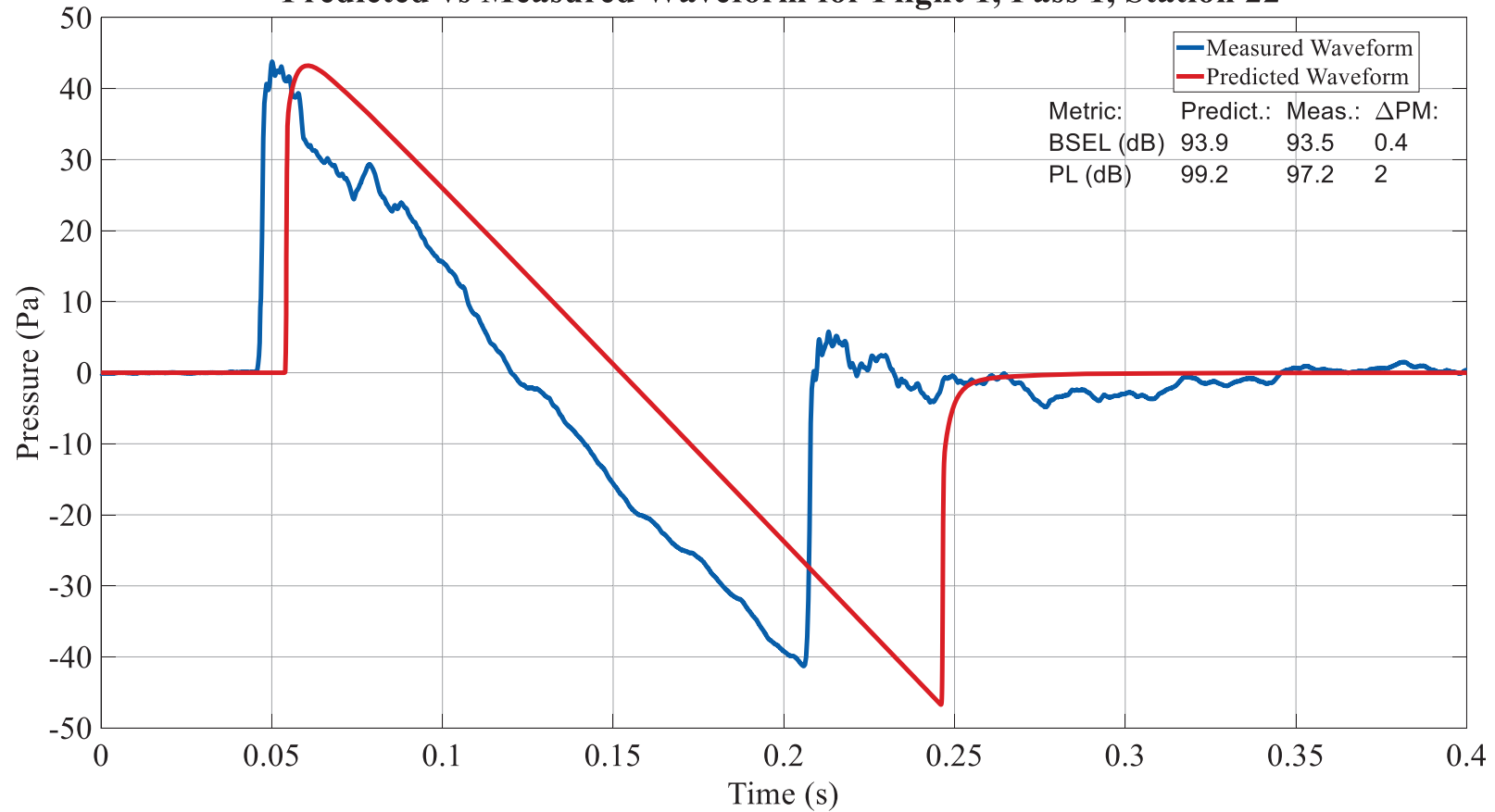
PCBoom Predictions: Flight 1 Station 18 Example

PCBoom Results Station 18



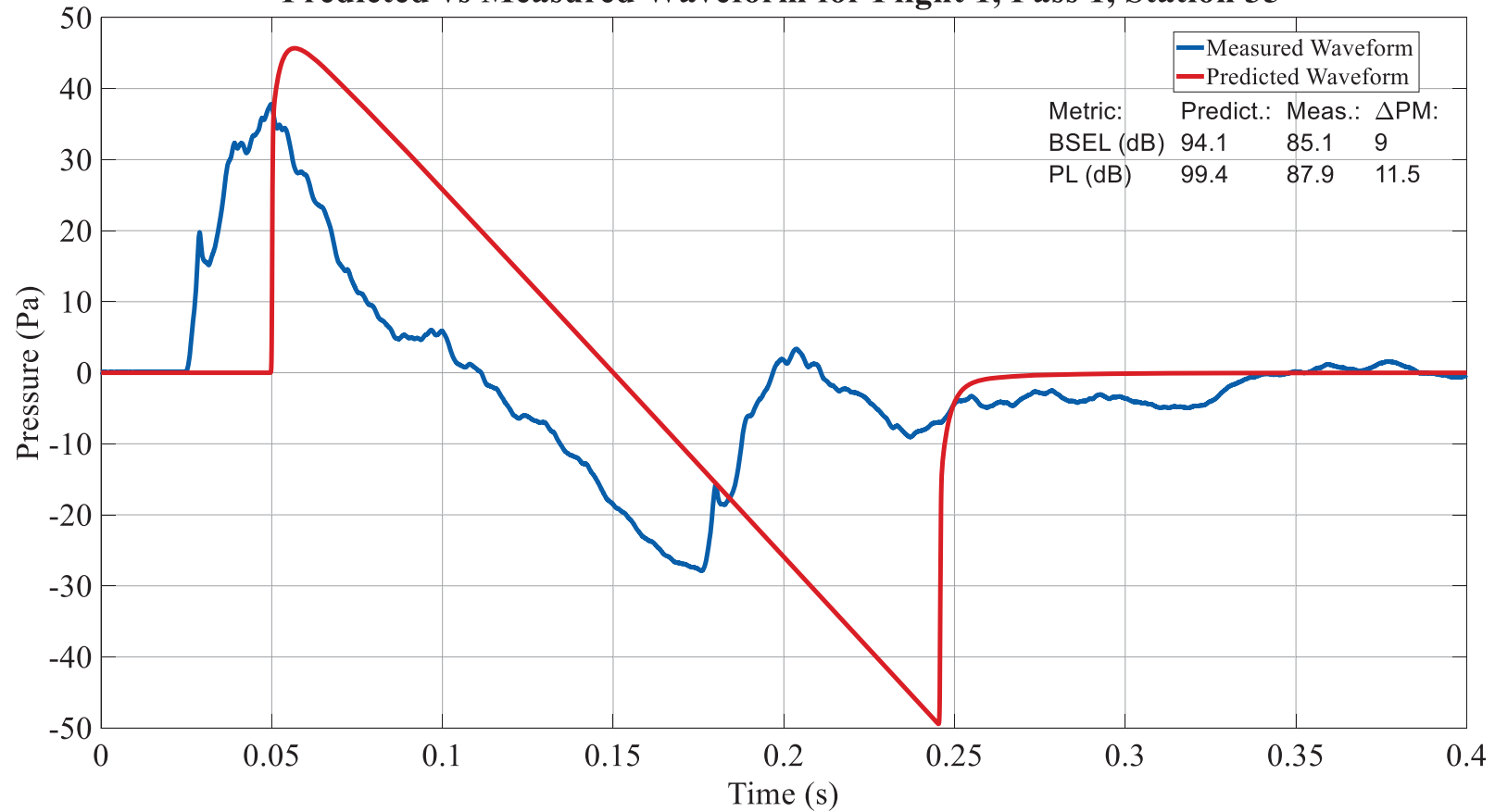
Example Waveforms

Predicted vs Measured Waveform for Flight 1, Pass 1, Station 22



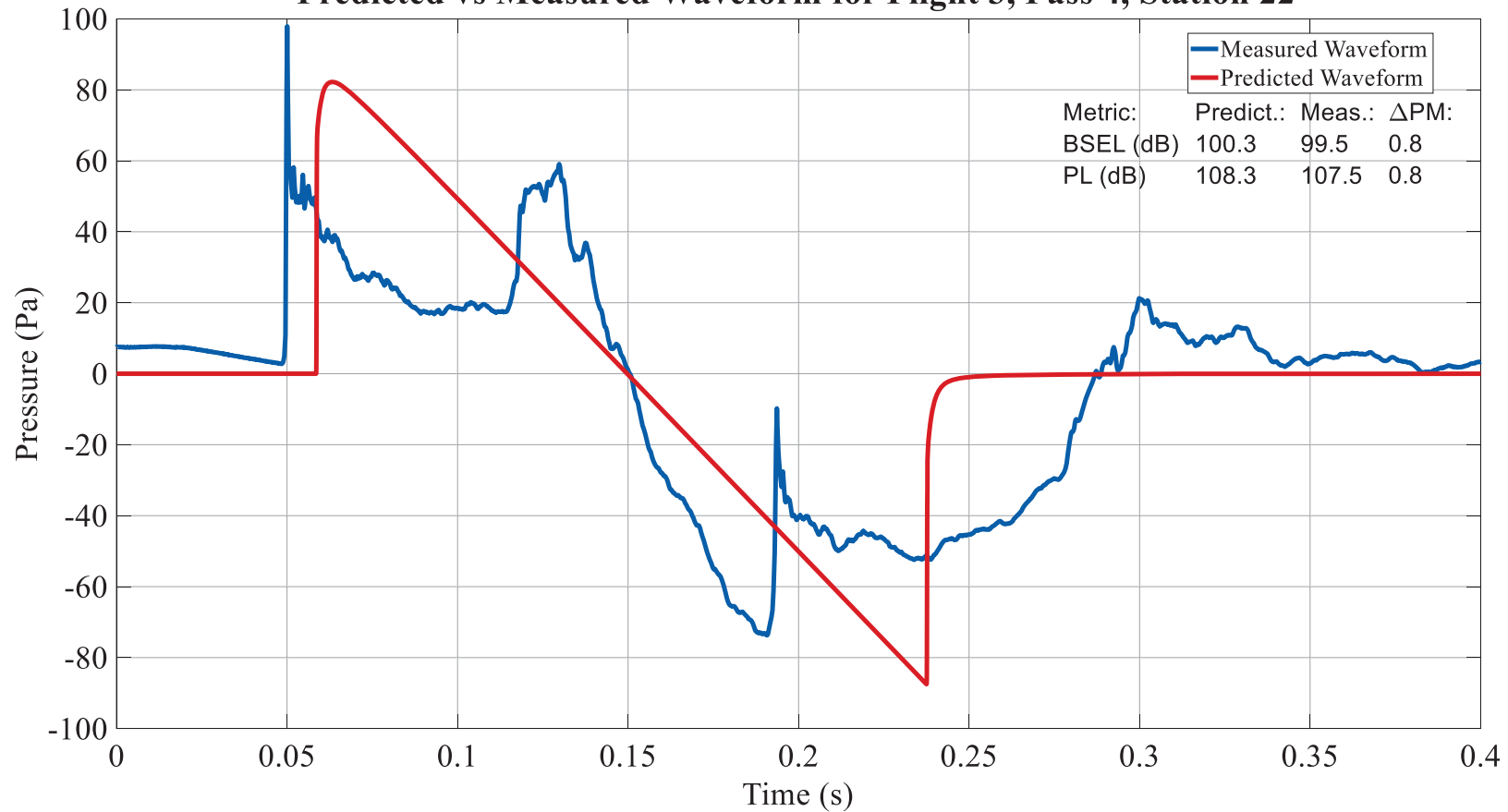
Example Waveforms

Predicted vs Measured Waveform for Flight 1, Pass 1, Station 35



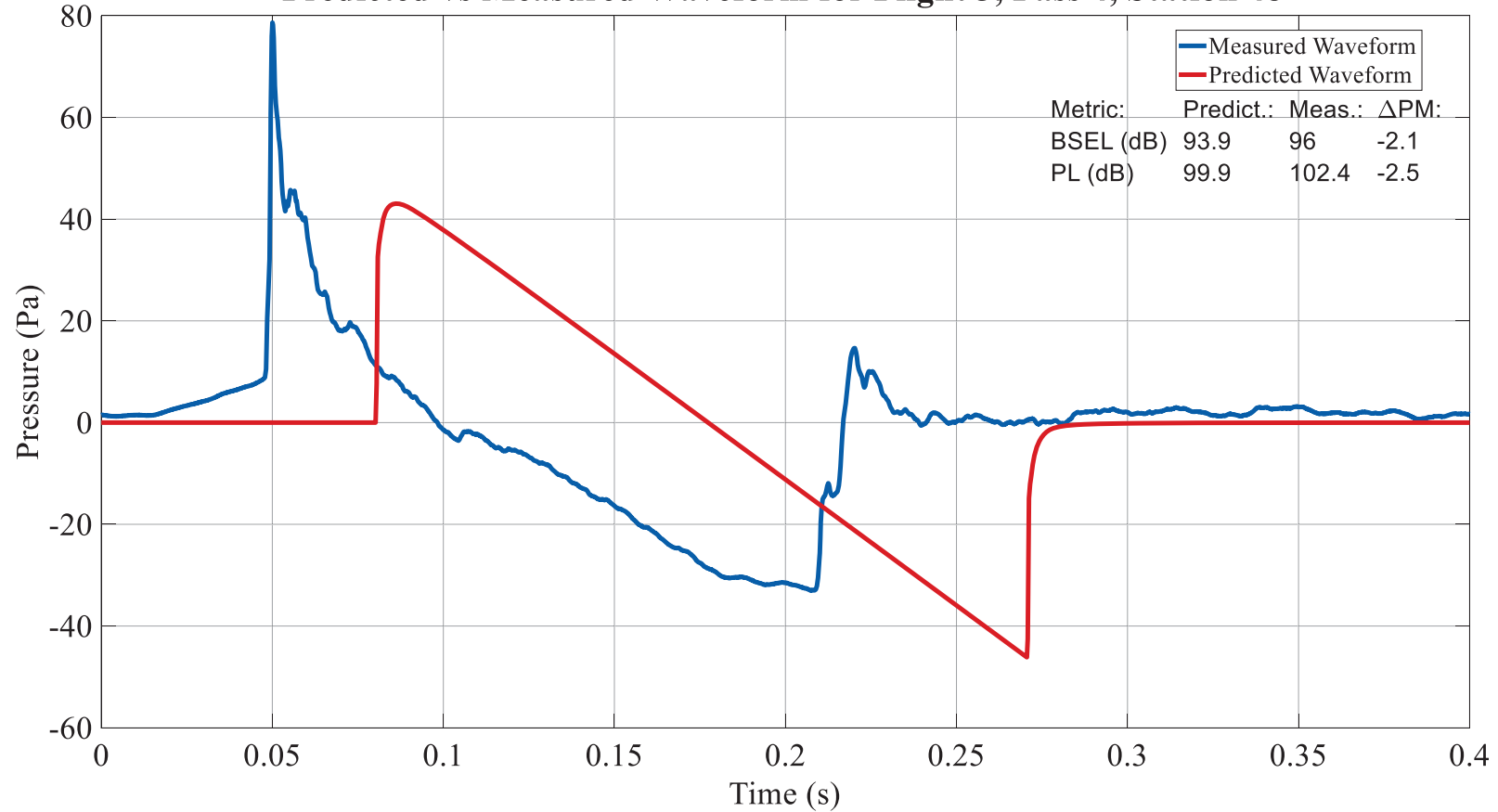
Example Waveforms

Predicted vs Measured Waveform for Flight 3, Pass 4, Station 22



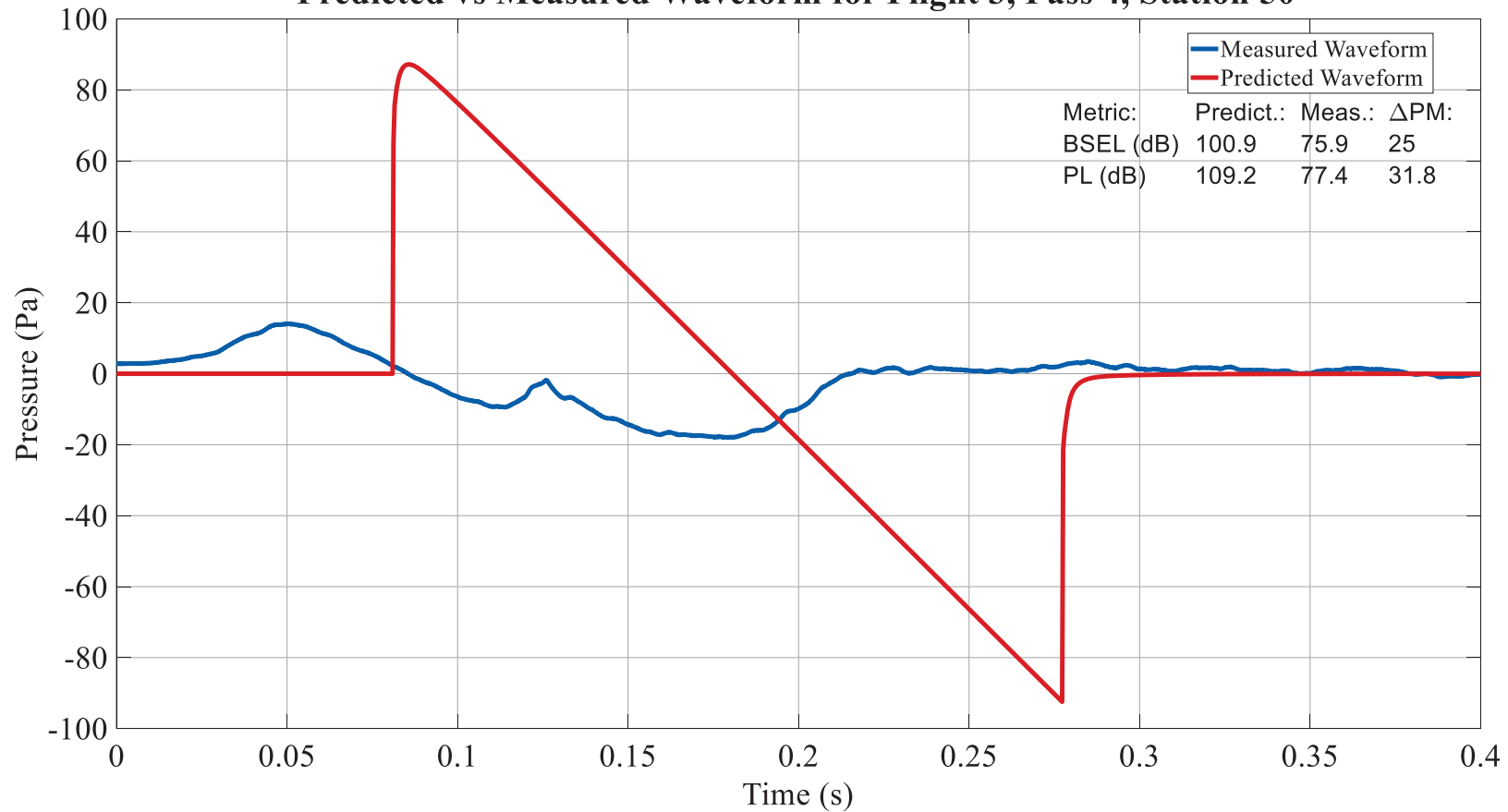
Example Waveforms

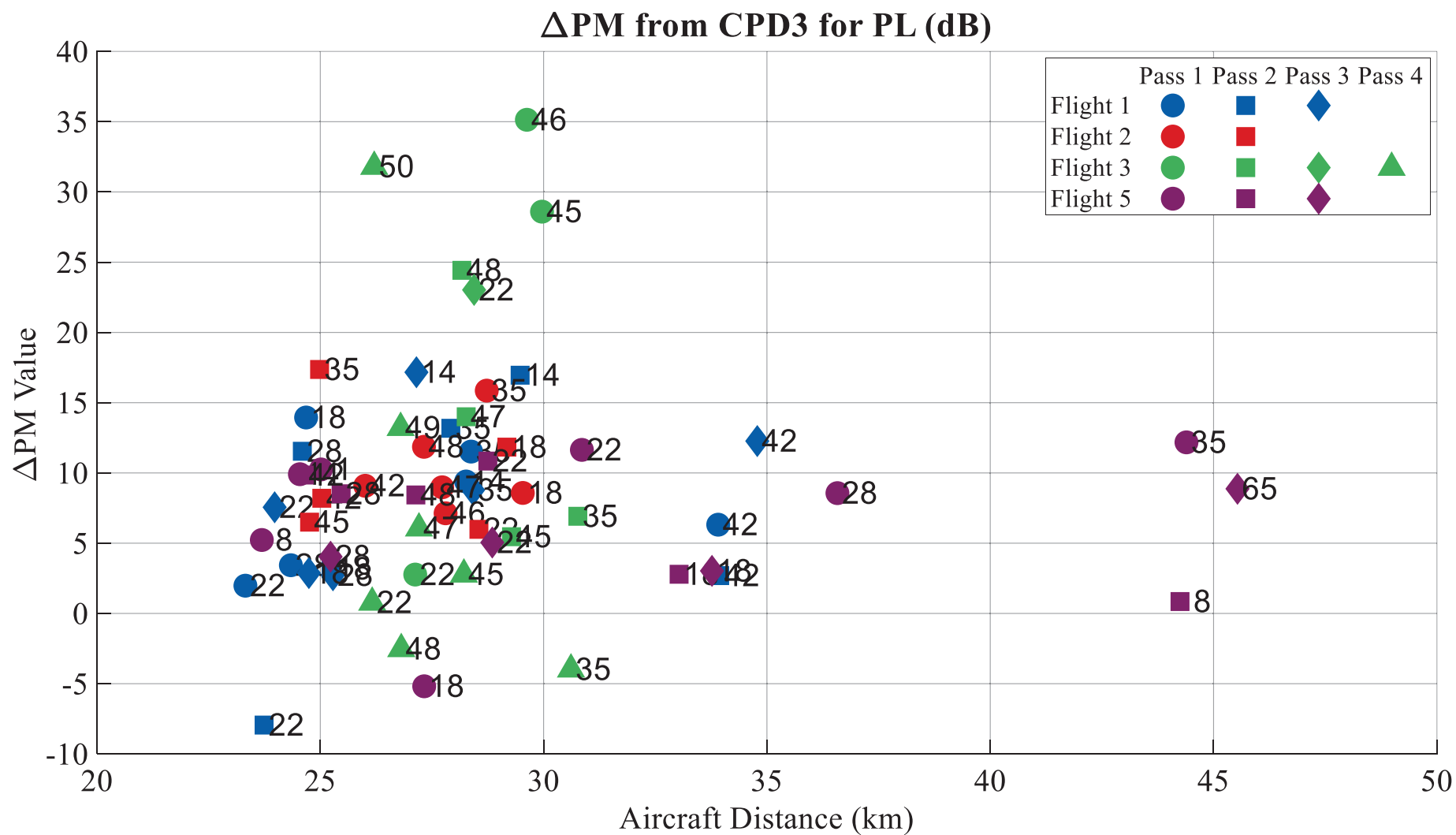
Predicted vs Measured Waveform for Flight 3, Pass 4, Station 48

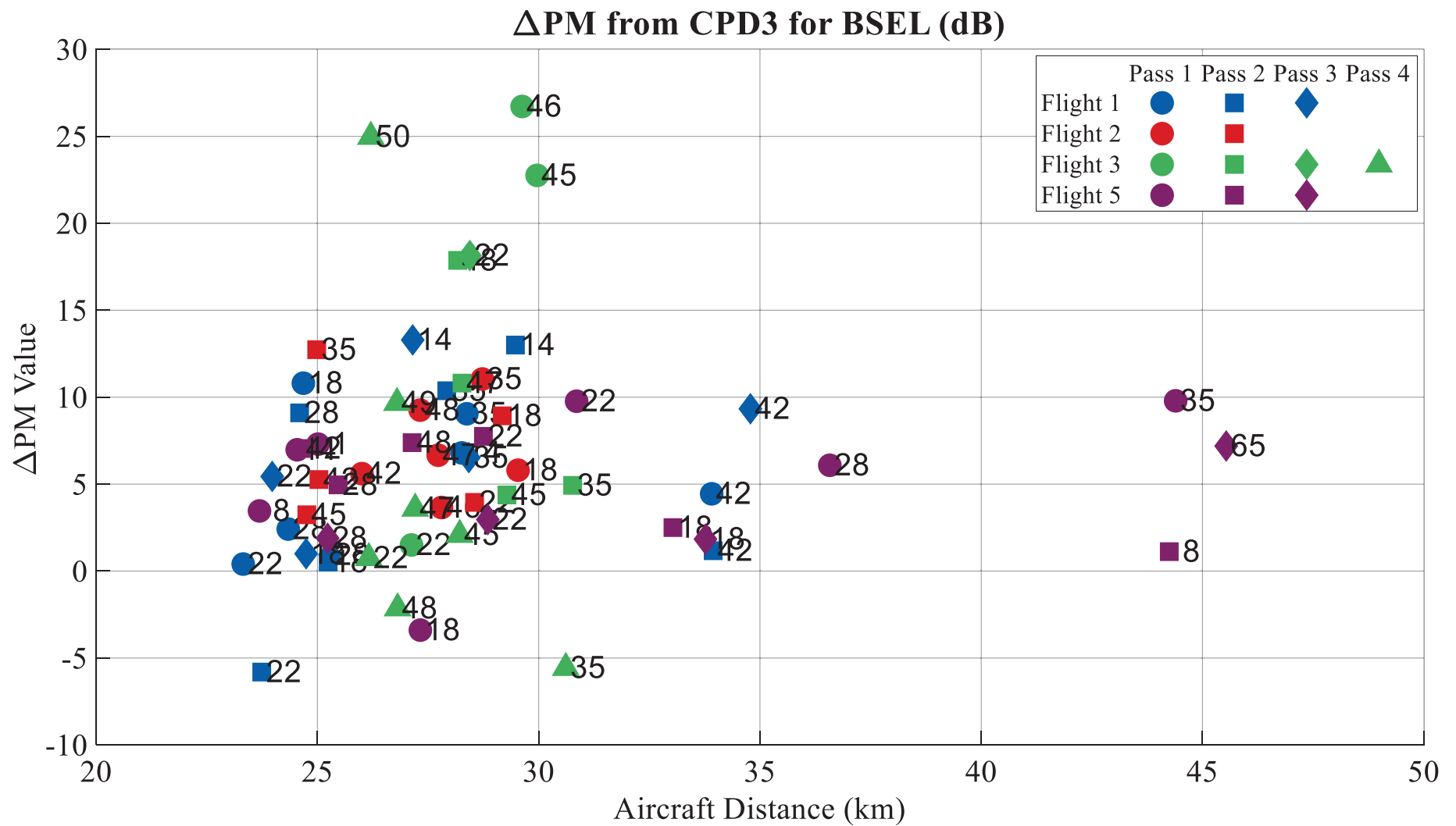


Example Waveforms

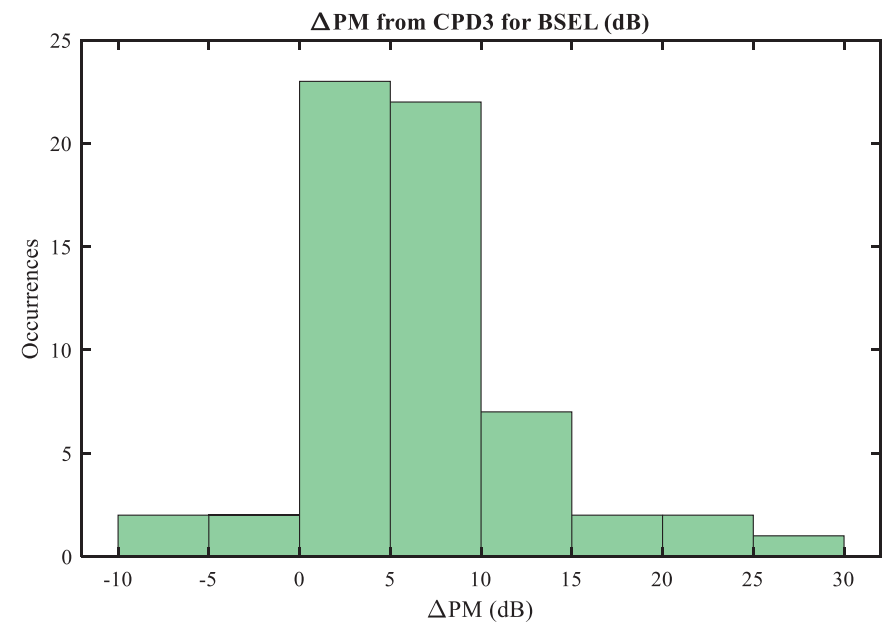
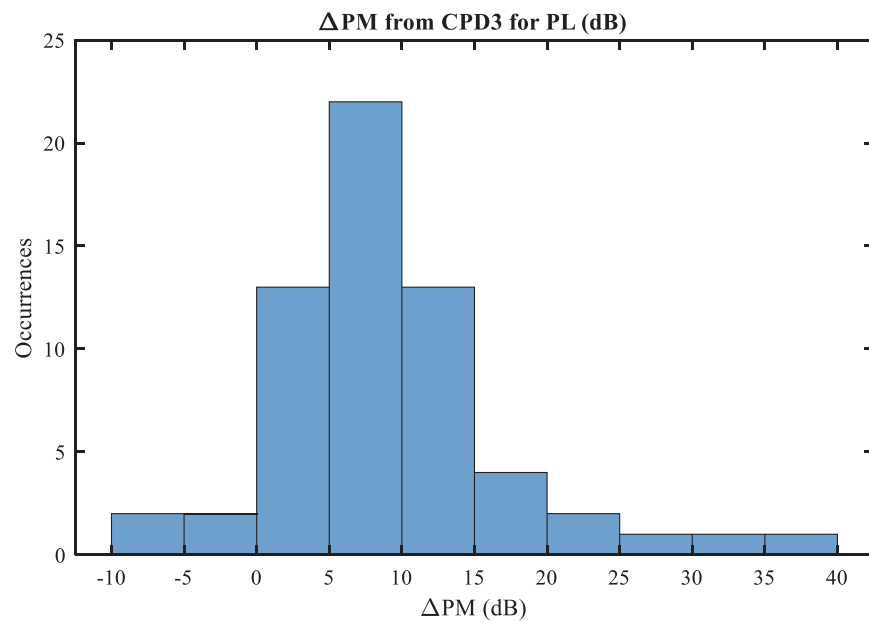
Predicted vs Measured Waveform for Flight 3, Pass 4, Station 50







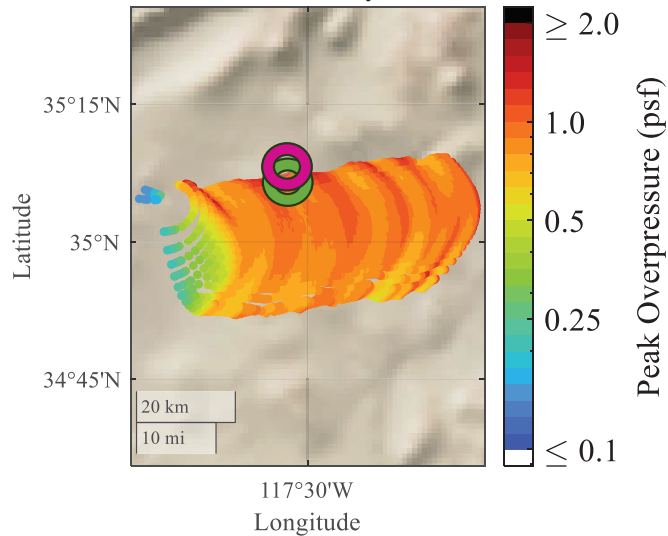
Δ PM Values for PL and BSEL



Carpet Edge Cutoff

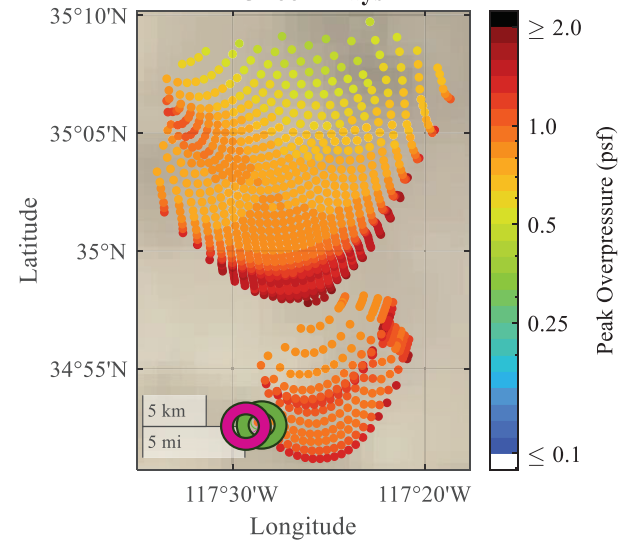
PCBoom Results Station 8 - No Boom Predicted

PCBoom Rays

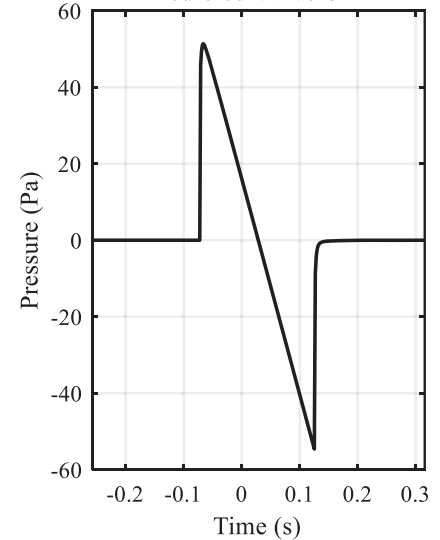


PCBoom Results Station 45

PCBoom Rays



Predicted Waveform



Audible Boom Beyond Predicted Cutoff

No Distinct Boom Within Predicted Carpet

Looking Forward

Conclusions:

- Waveform details not well predicted
- Large ΔPM values
 - Nearly all overpredicted
- Measured carpet edge varies from predictions

Future Work:

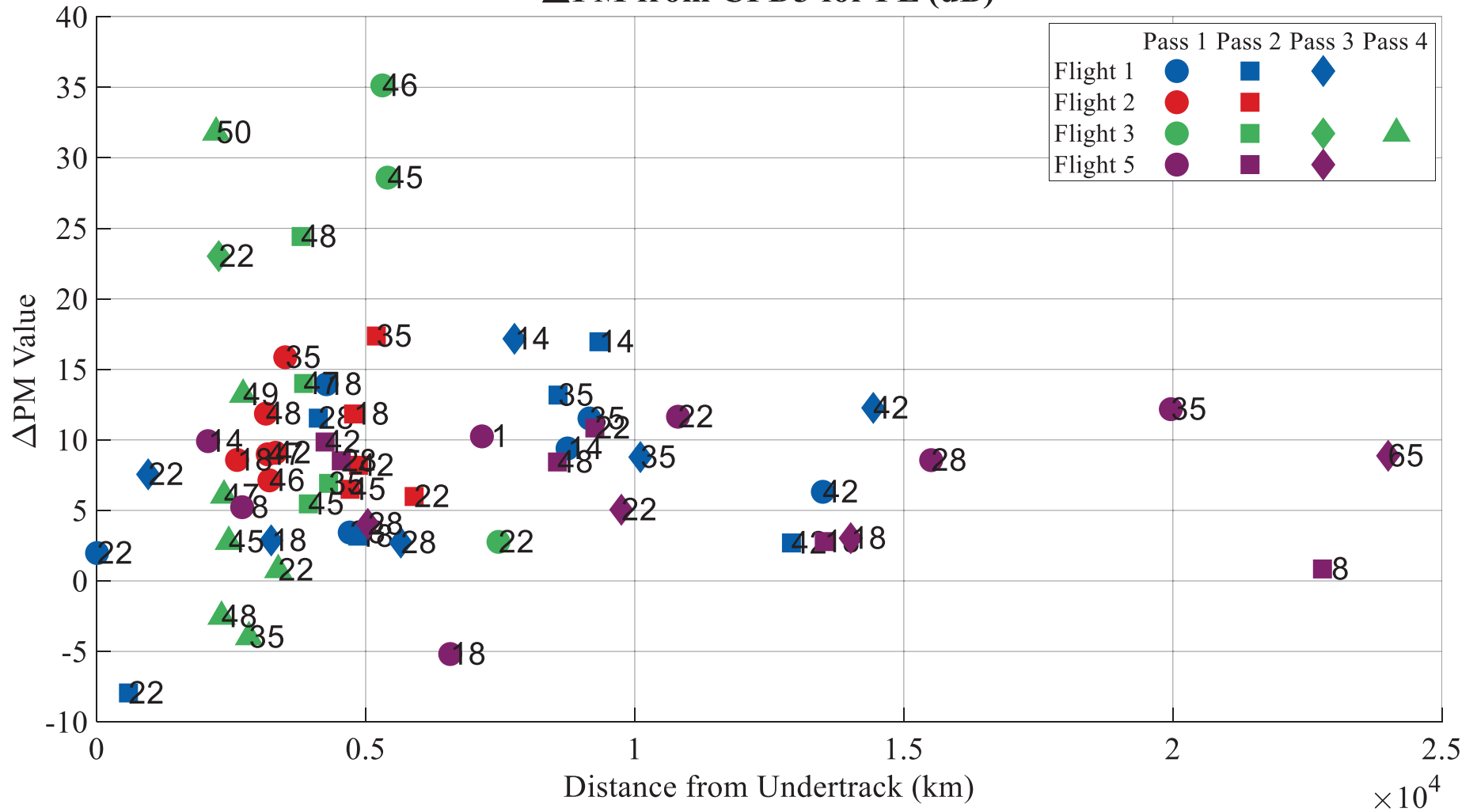
- NASA Quesst Phase 2 Dry Run Data
 - More simultaneous stations
 - Longer series of tests
- ARISTOTLE measurements
- Investigate causes of variability



Any Questions?



Δ PM from CPD3 for PL (dB)



$\times 10^4$

Negative ΔPM

