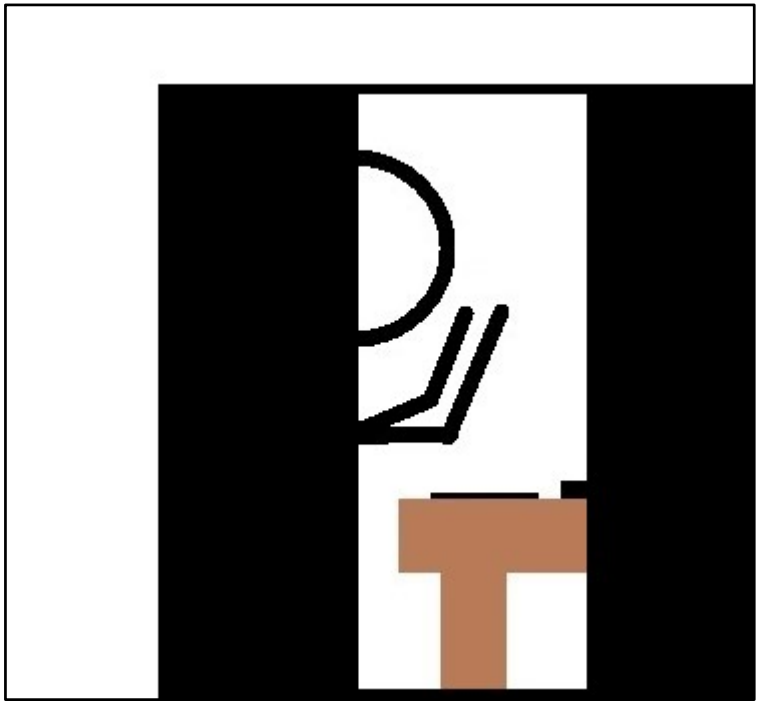
DOE/NV/25946--2853

MPDV Analysis: Inside the Black Box



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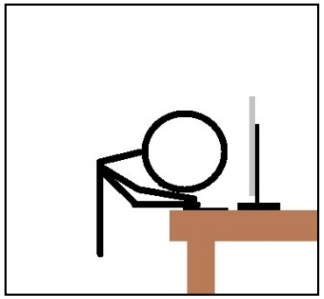
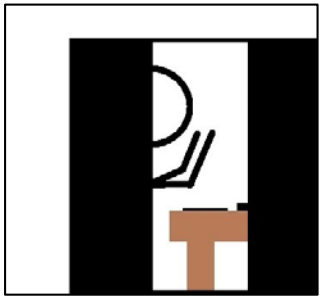
This presentation describes the MPDV data analysis workflow

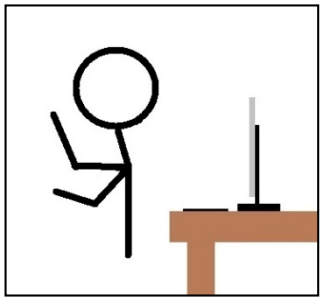
What's needed



What's done



What's returned



The MPDV analysis process requires multiple inputs

Data

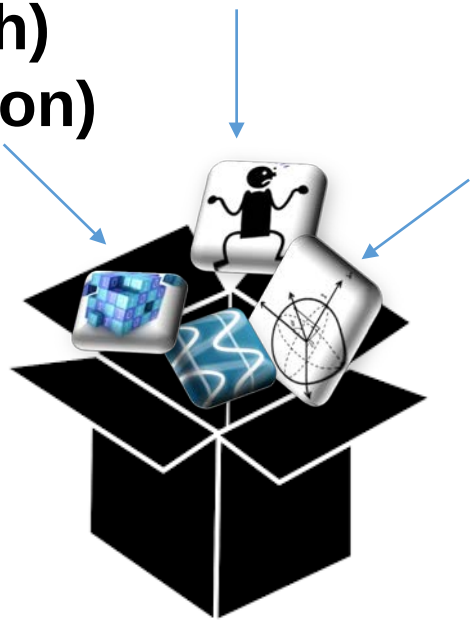
- MPDV data

Probe parameters

- Orientation (polar, azimuth)
- System link (record location)

System parameters

- ITU frequencies
- Timing

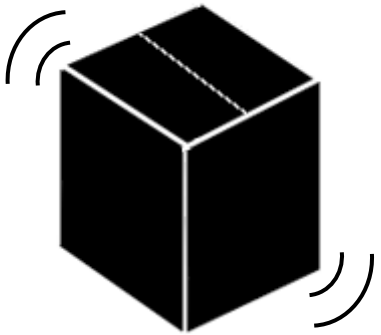


MPDV analysis is more than extracting velocity traces

Setup
- Log file
- Timing file
- Segmenting data

Pre-analysis
- Impulse runs
- Detonator runs

Analysis per probe☠
- ROI (50–100 points)
- Extract velocity
- Time correct extraction
- Verify results



☠ Process is intense and iterative, requiring multiple create, save, and check operations.

The software tools used for MPDV data workflow

Analysis

- QuickView
- QuickDivide
- TimeCorrection

Visuals

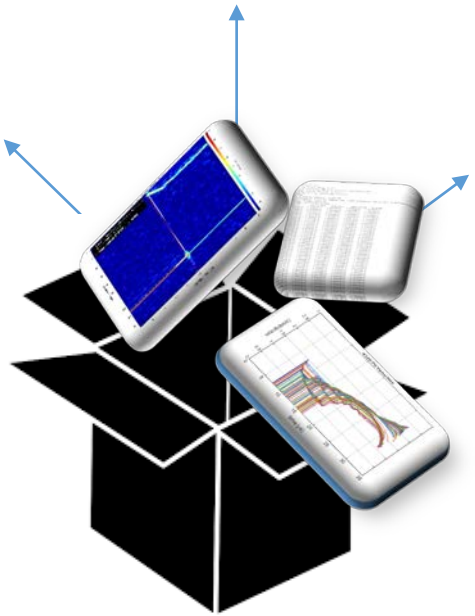
- QuickPlotter
- Breakout vs. polar
- End of trace vs. polar
- CheckAnalysis

The complete analysis generates a wealth of information

Text
- Velocity data
- Analysis notes

Visualizations
- Various time plots
- Velocity
- Integrated velocity
- Spectrograms

Spreadsheets
- Log sheet
- Timing
- Mapping

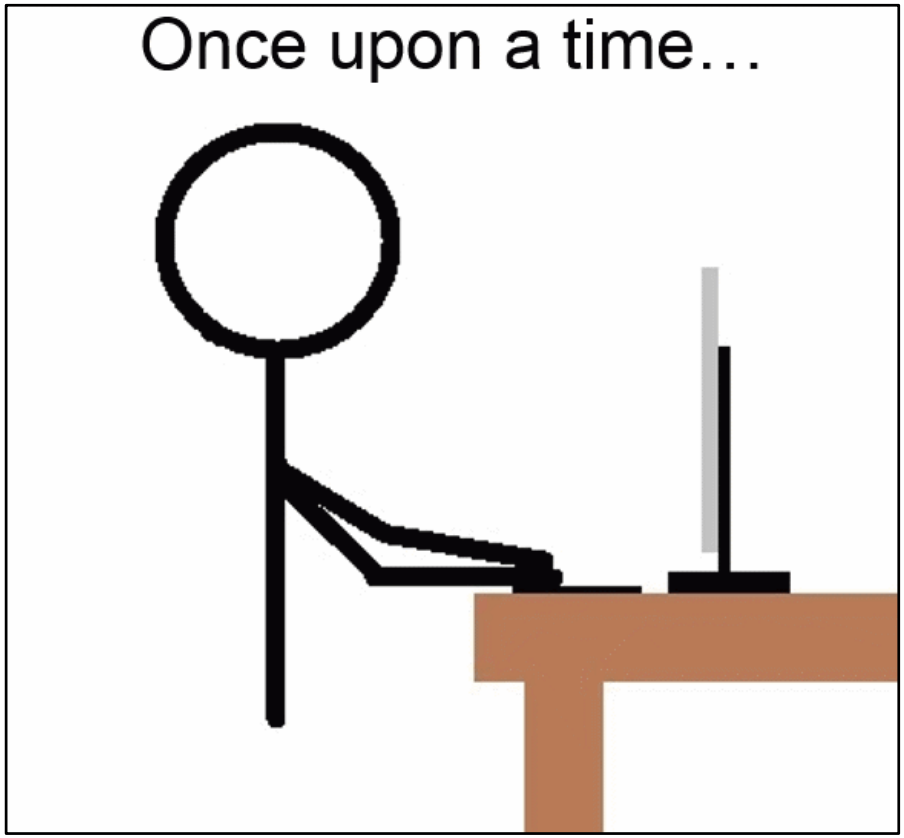


The following examples come from a 4×2 MPDV and a 1×8 MPDV (deep time)

Workflow

1. **Setup**
2. **Extract**
3. **Correct**
4. **Verify**
5. **Visualize**
6. **Deliver data package**
7. ~~**Change stuff**~~

After setup the infamous Extractions…



Velocity text files are the key result in MPDV analysis

Data source
- DIG filename

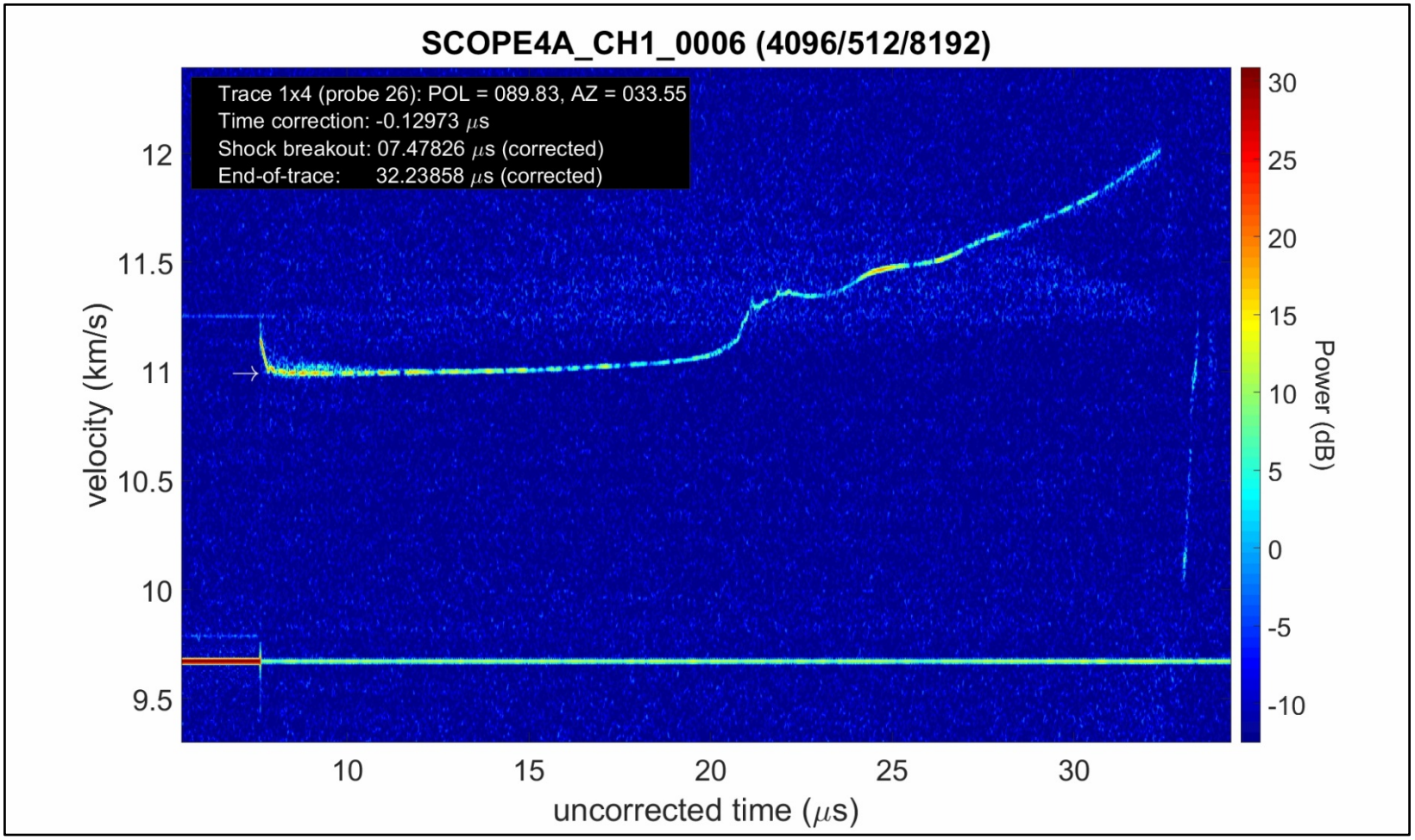
Analysis parameters
- FFT parameters

Analysis results
- Time, Velocity
- Uncertainty
- Max Signal, noise
- Breakout time
- End of trace time

Probe info
- Probe name
- Polar angle
- Azimuthal angle

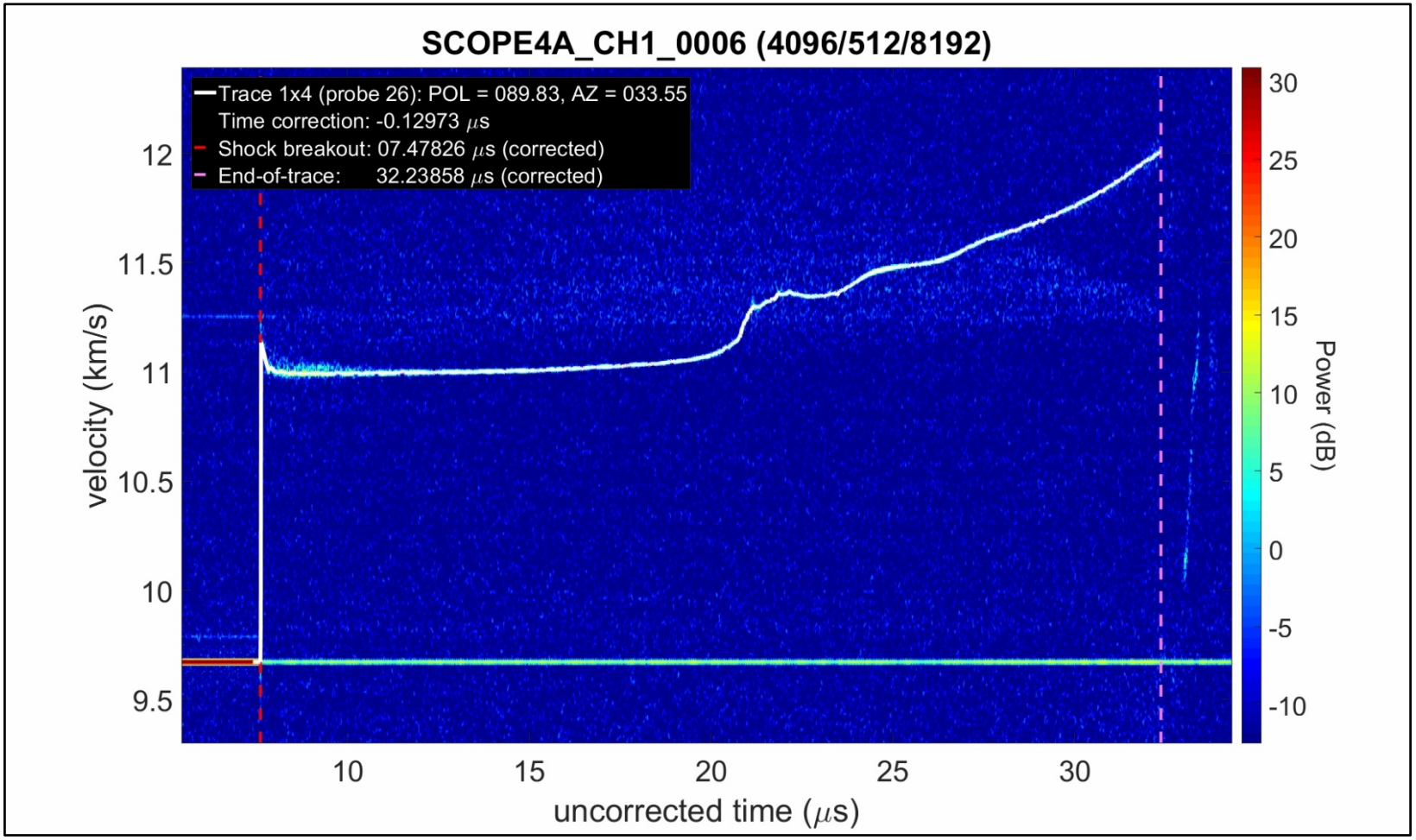
System parameters
- Baseline frequency
- Wavelength of laser
- Delay time

Verification Image: probe 26 (4×2 data)



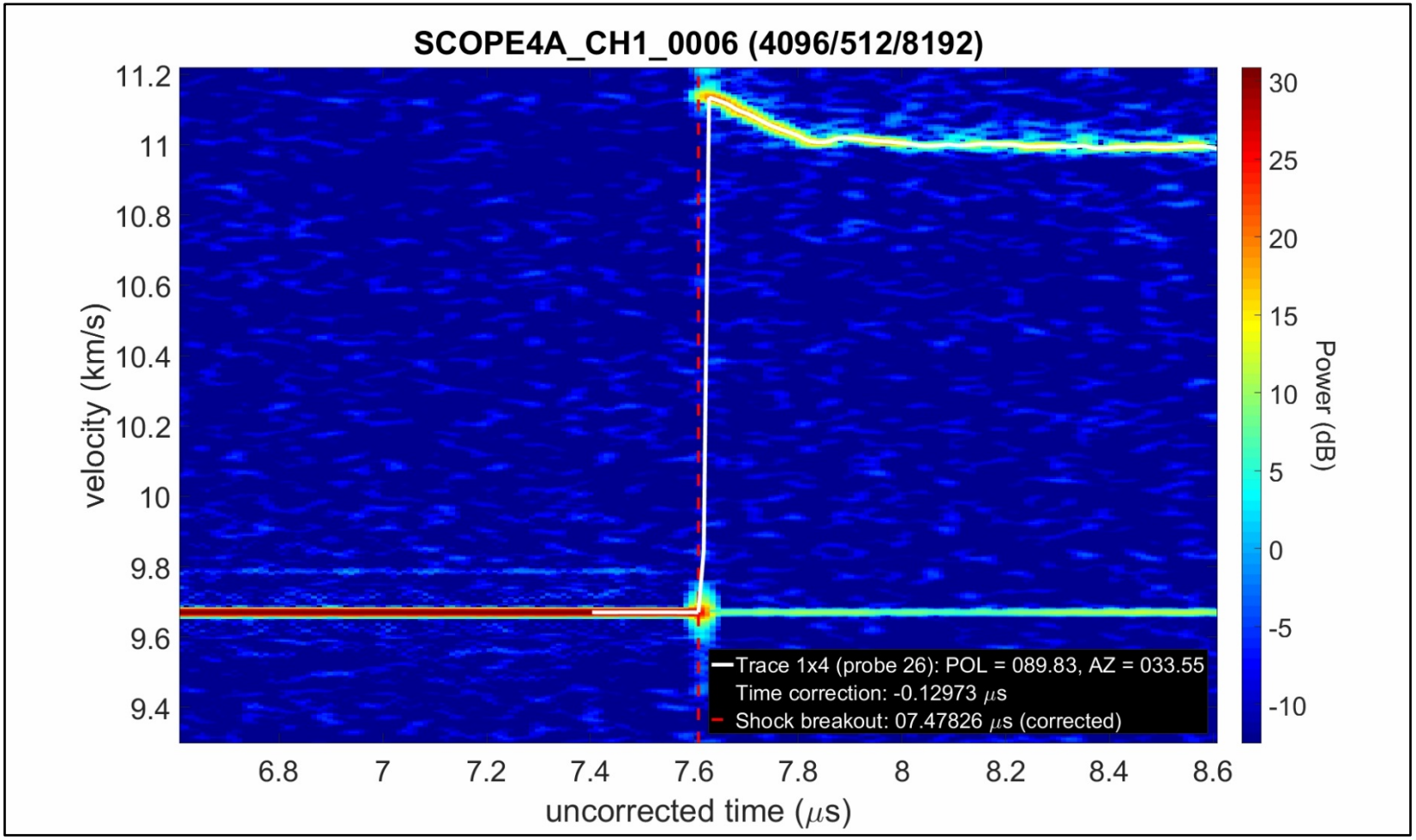
Analysis results with key information highlighted

Verification Image: probe 26 (4×2 data)



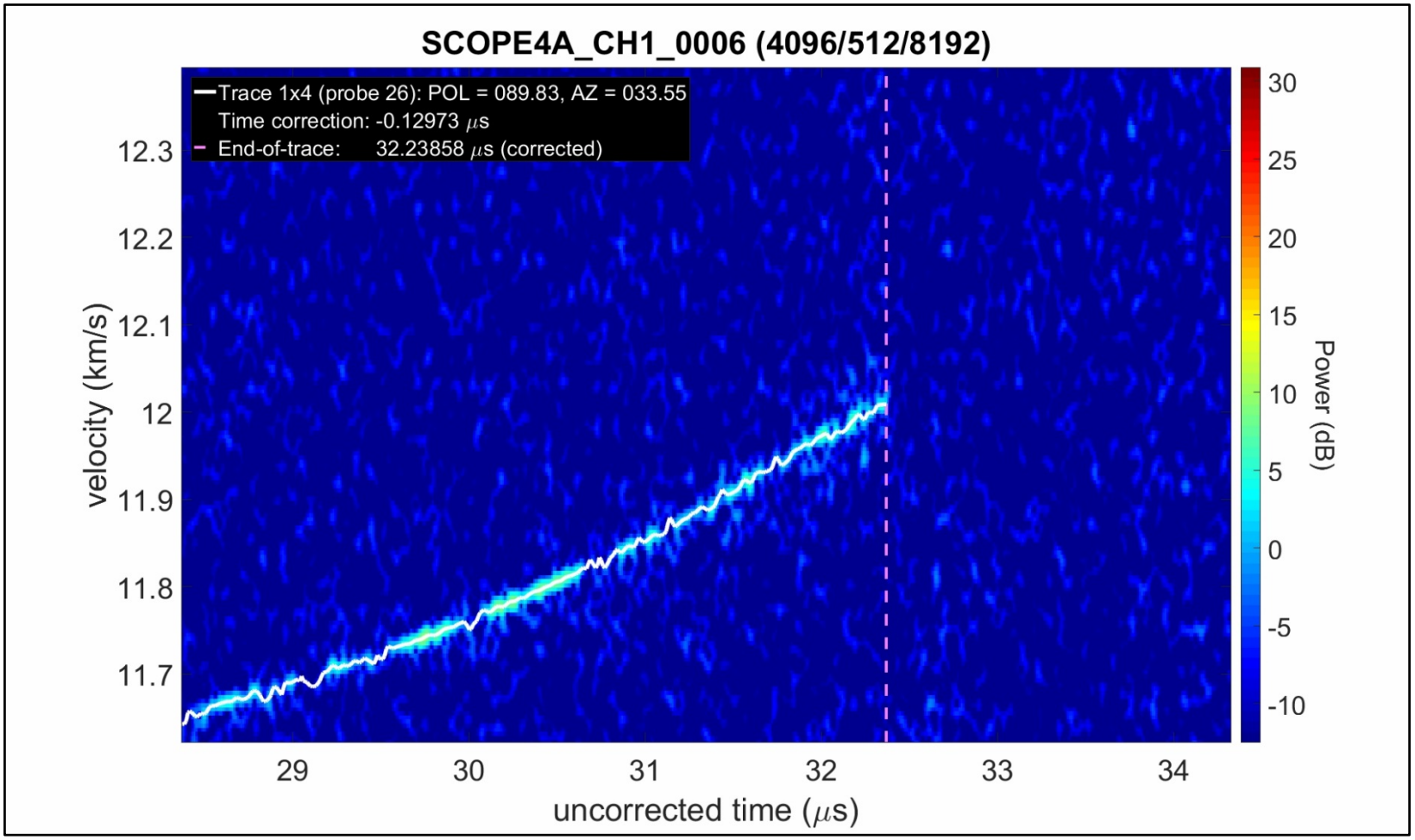
Analysis results with key information highlighted

Verification Image: probe 26 (4×2 data)



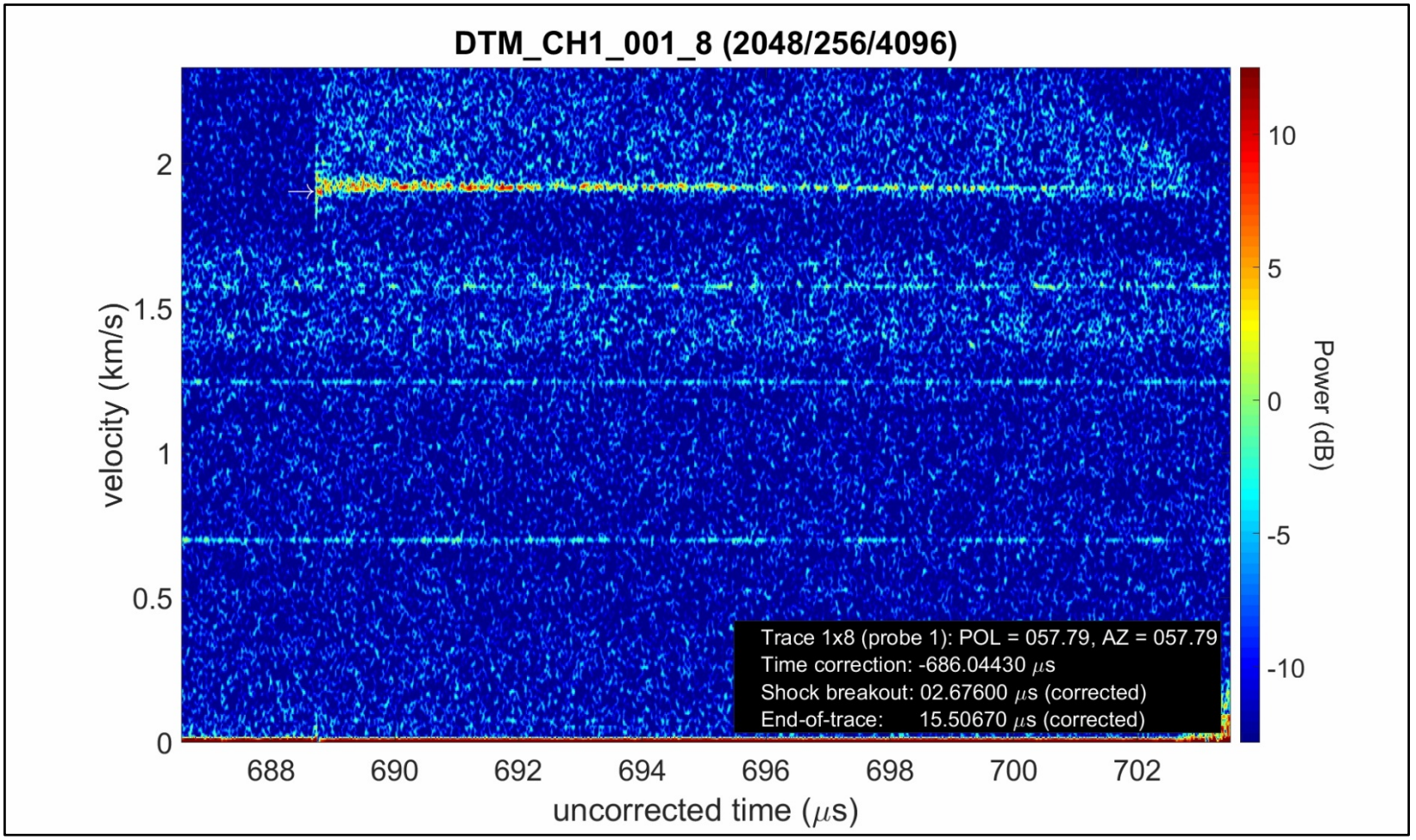
Analysis results with key information highlighted

Verification Image: probe 26 (4×2 data)



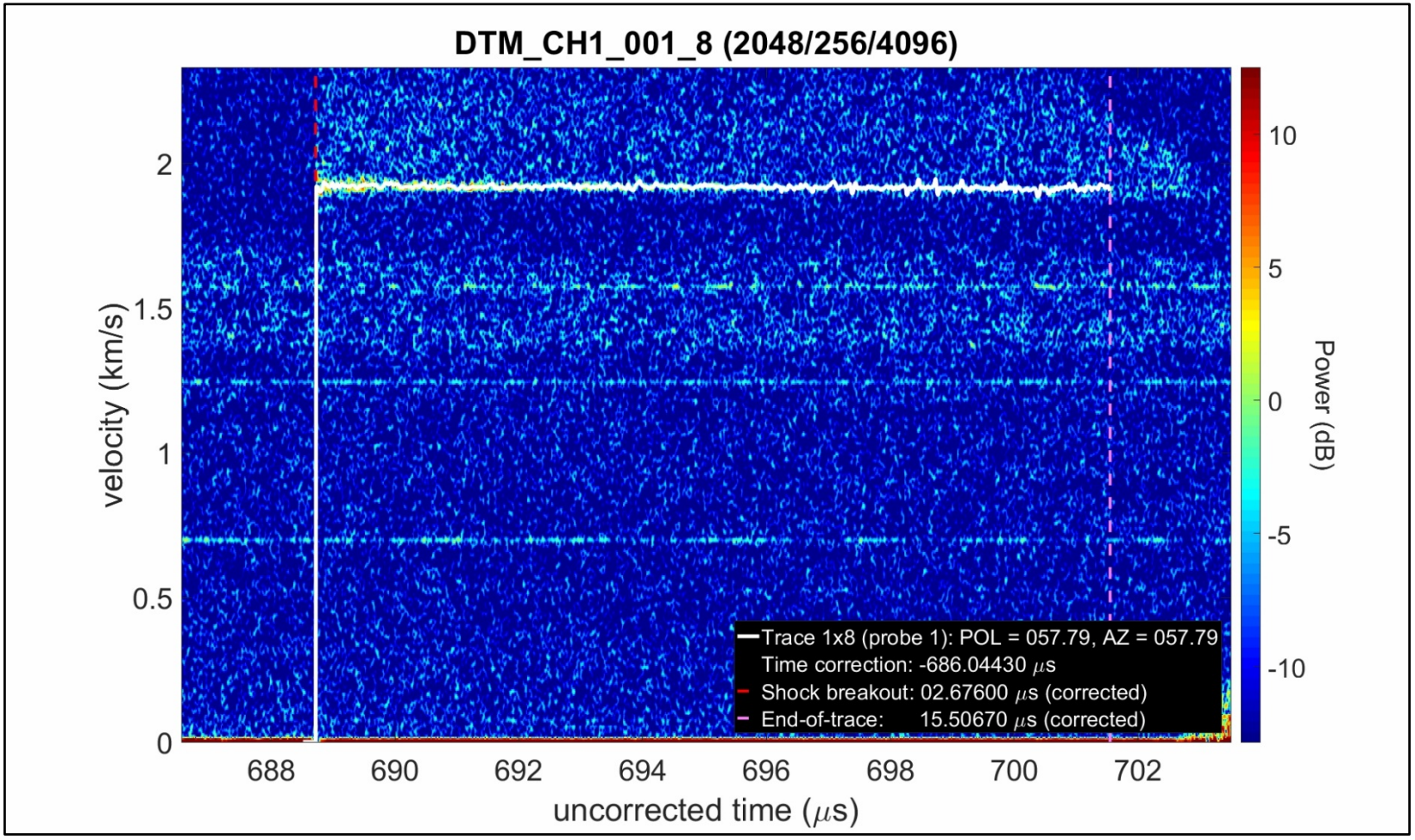
Analysis results with key information highlighted

Verification Image: probe 1 (1×8 data)



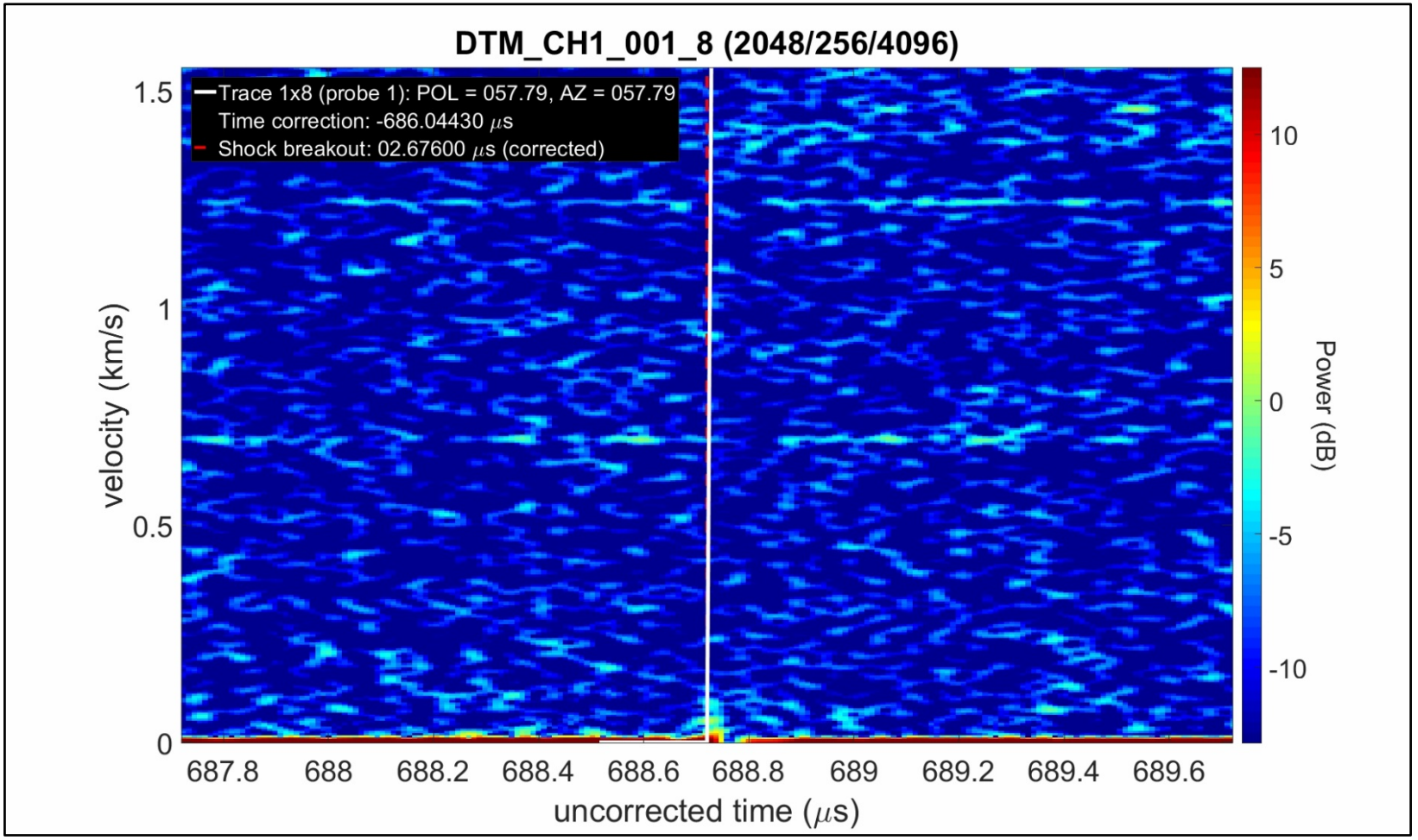
Analysis results with key information highlighted

Verification Image: probe 1 (1×8 data)



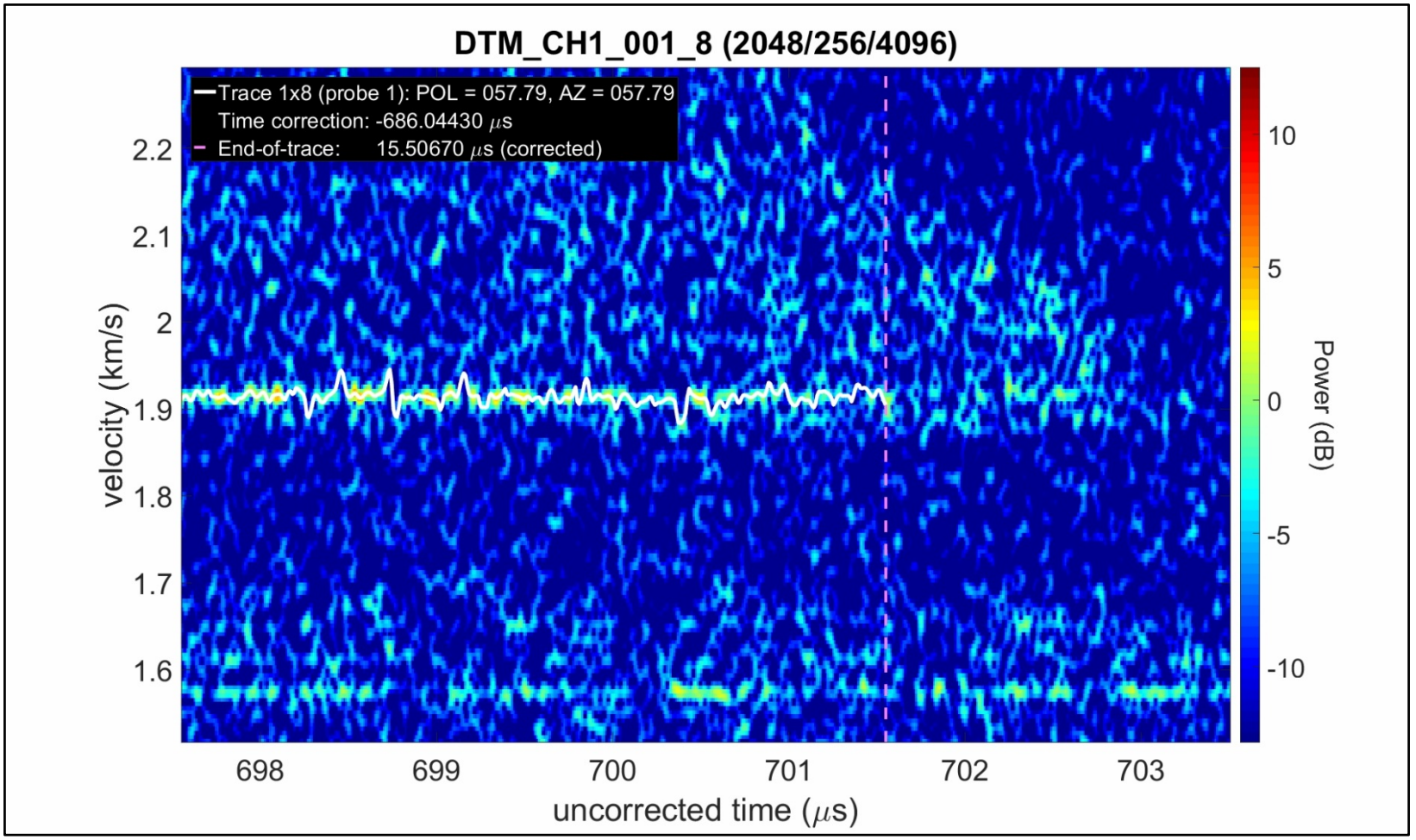
Analysis results with key information highlighted

Verification Image: probe 1 (1×8 data)



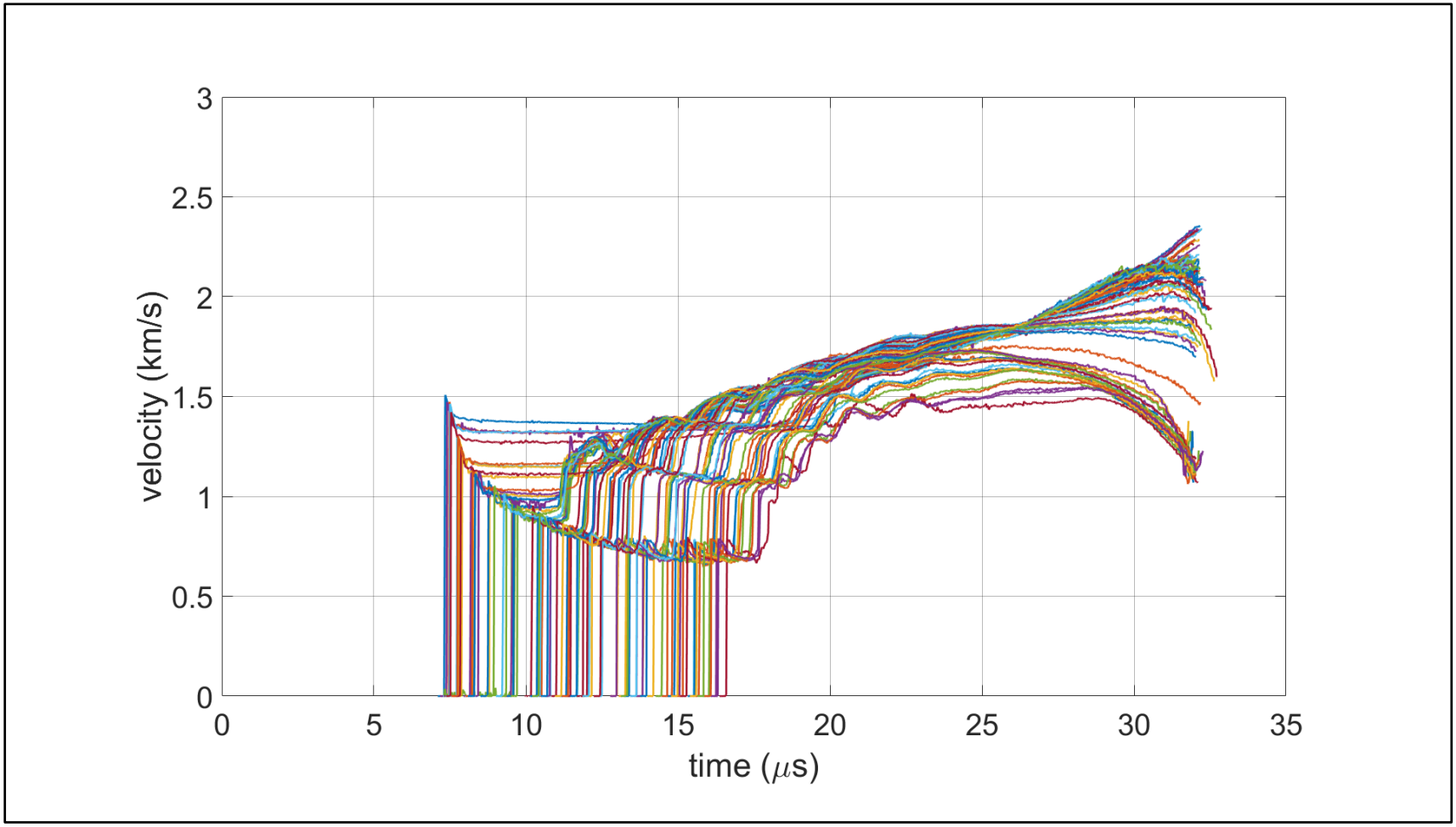
Analysis results with key information highlighted

Verification Image: probe 1 (1×8 data)



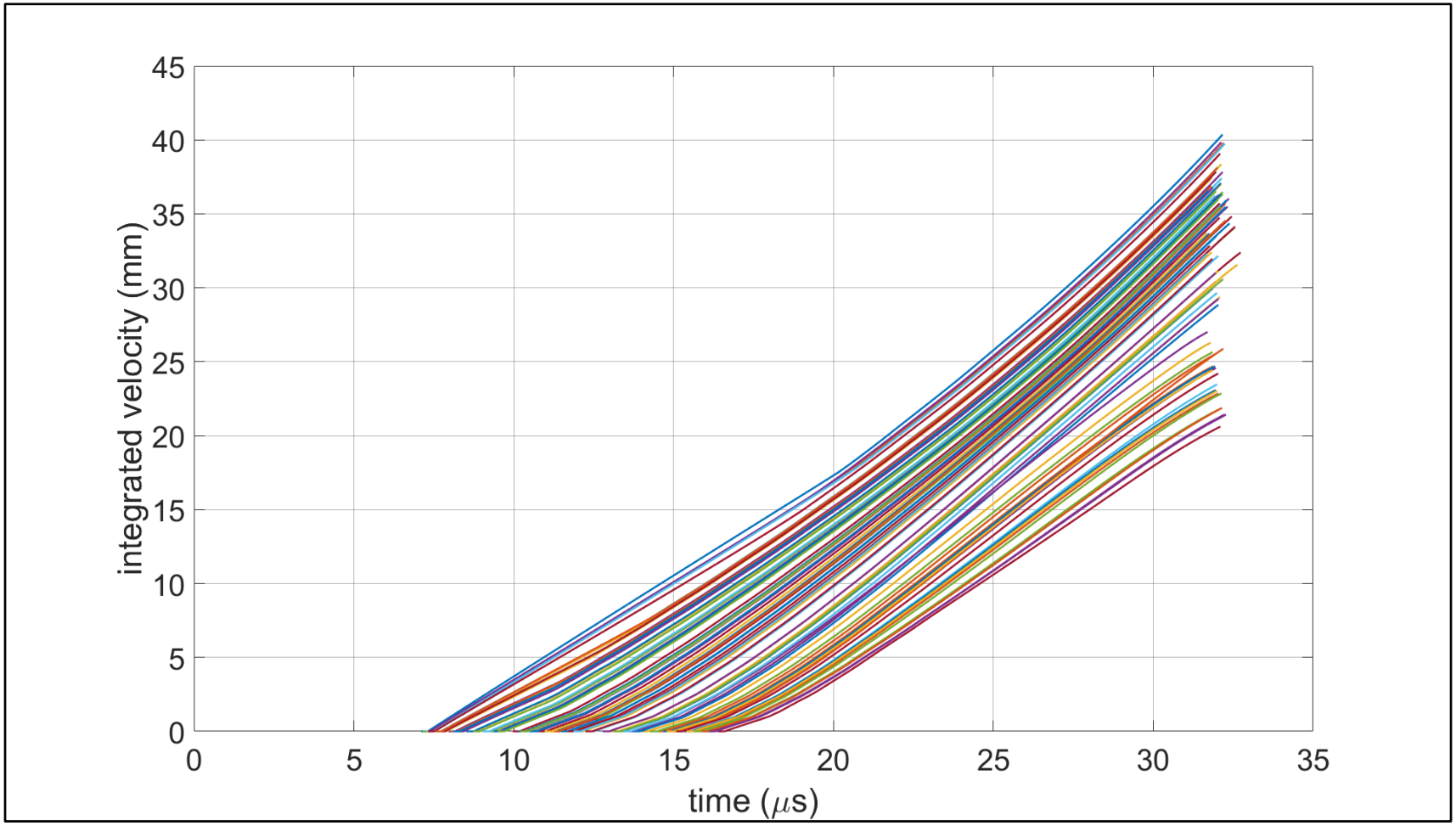
Analysis results with key information highlighted

Final velocities for H4320



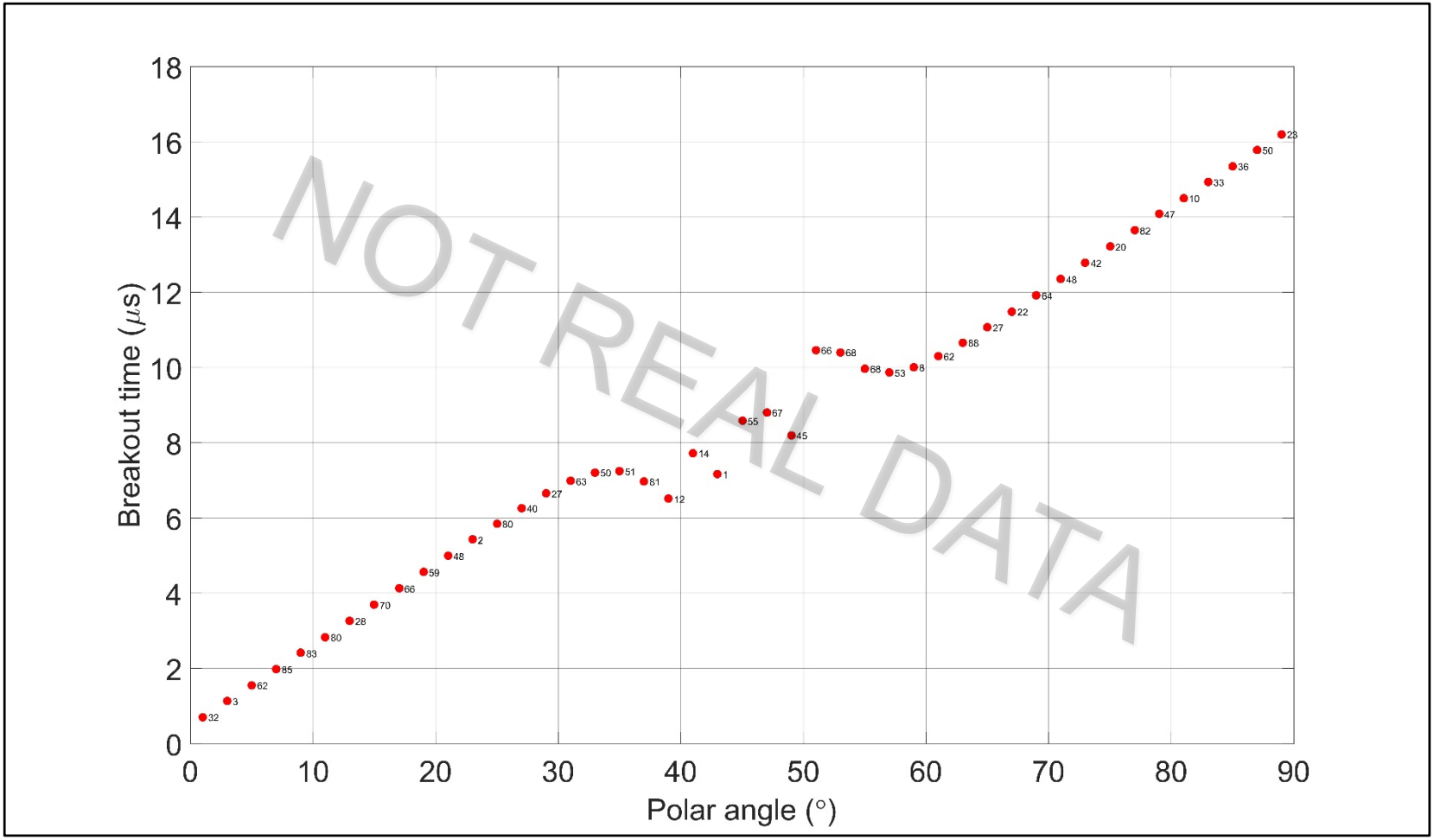
Group plot that provides insight into the experiment

Final integrated velocity for H4320



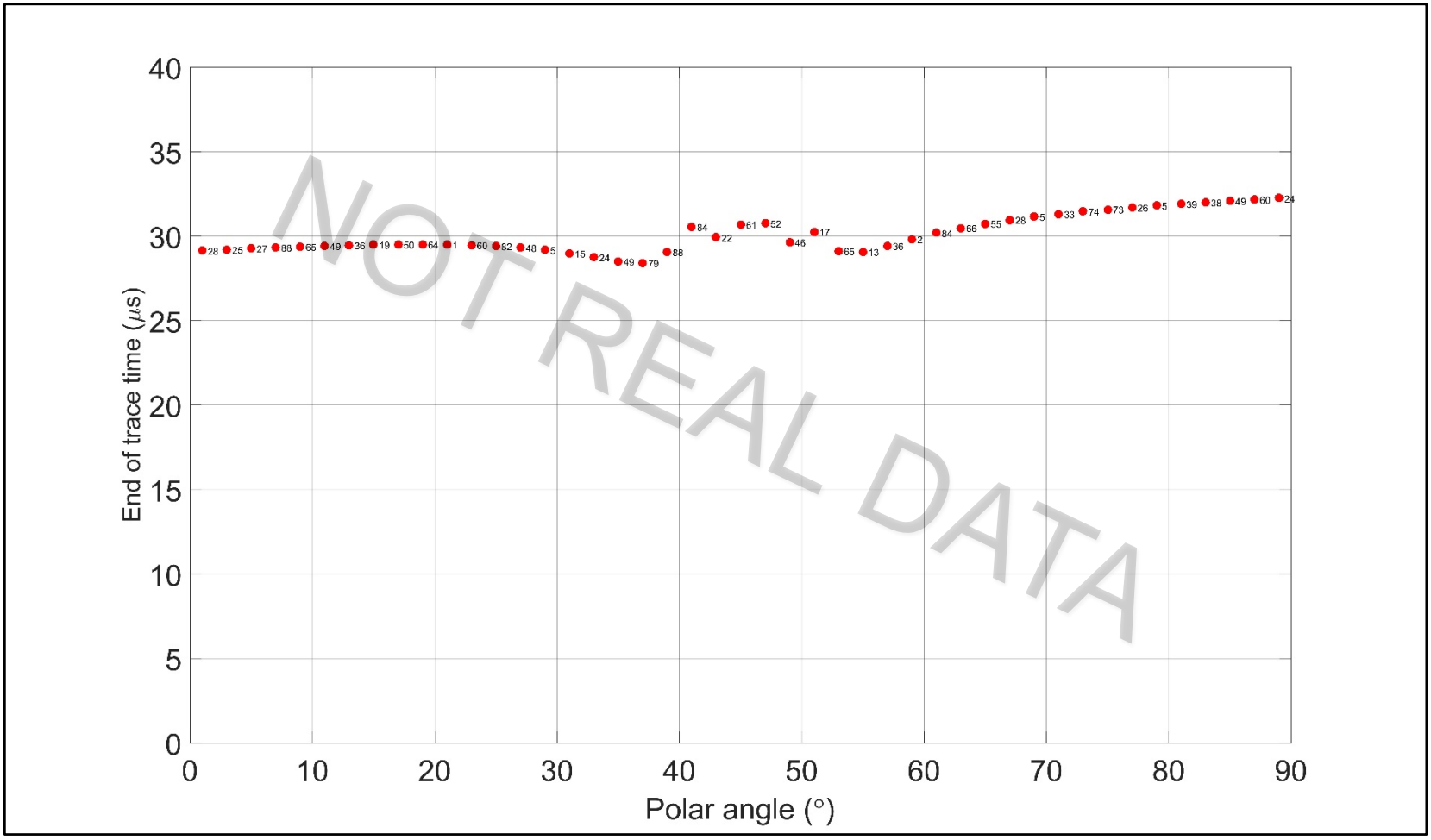
Group plot that provides insight into the experiment

Example of Breakout vs. polar angle



Plot that provides insight into the experiment

Example of end of trace vs. polar angle



Plot that provides insight into the experiment

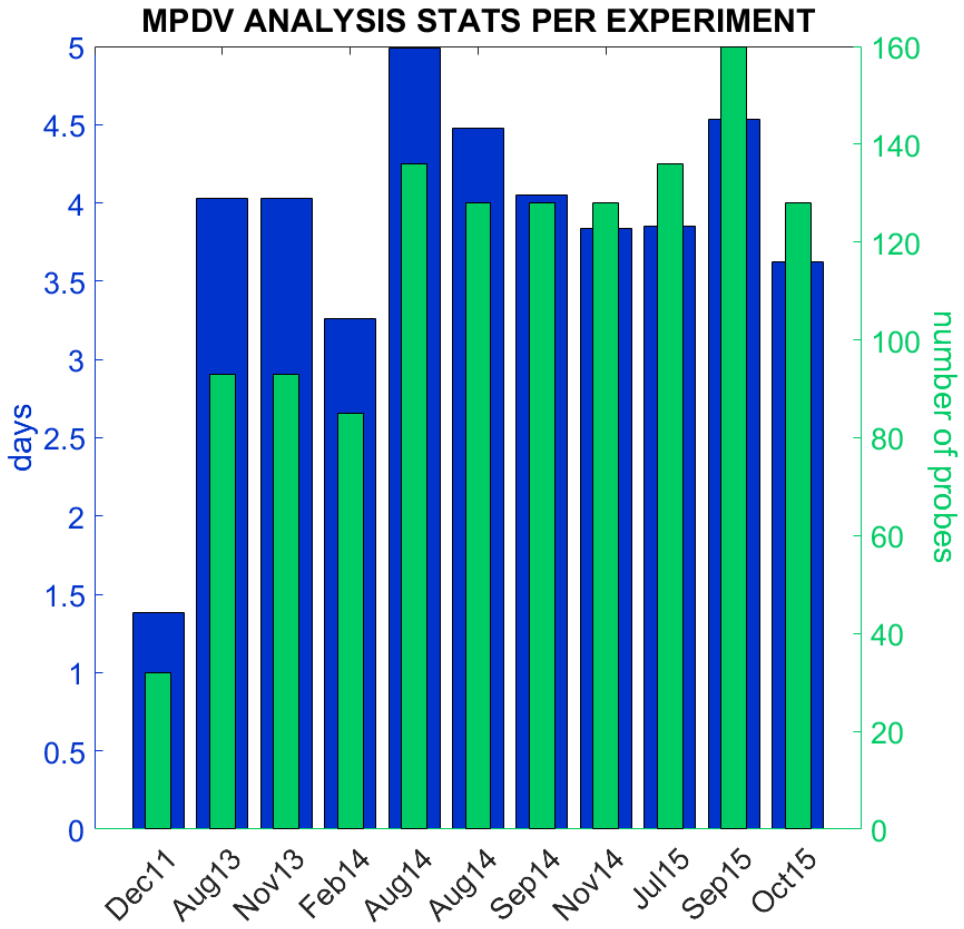
MPDV analysis history

Increased robustness

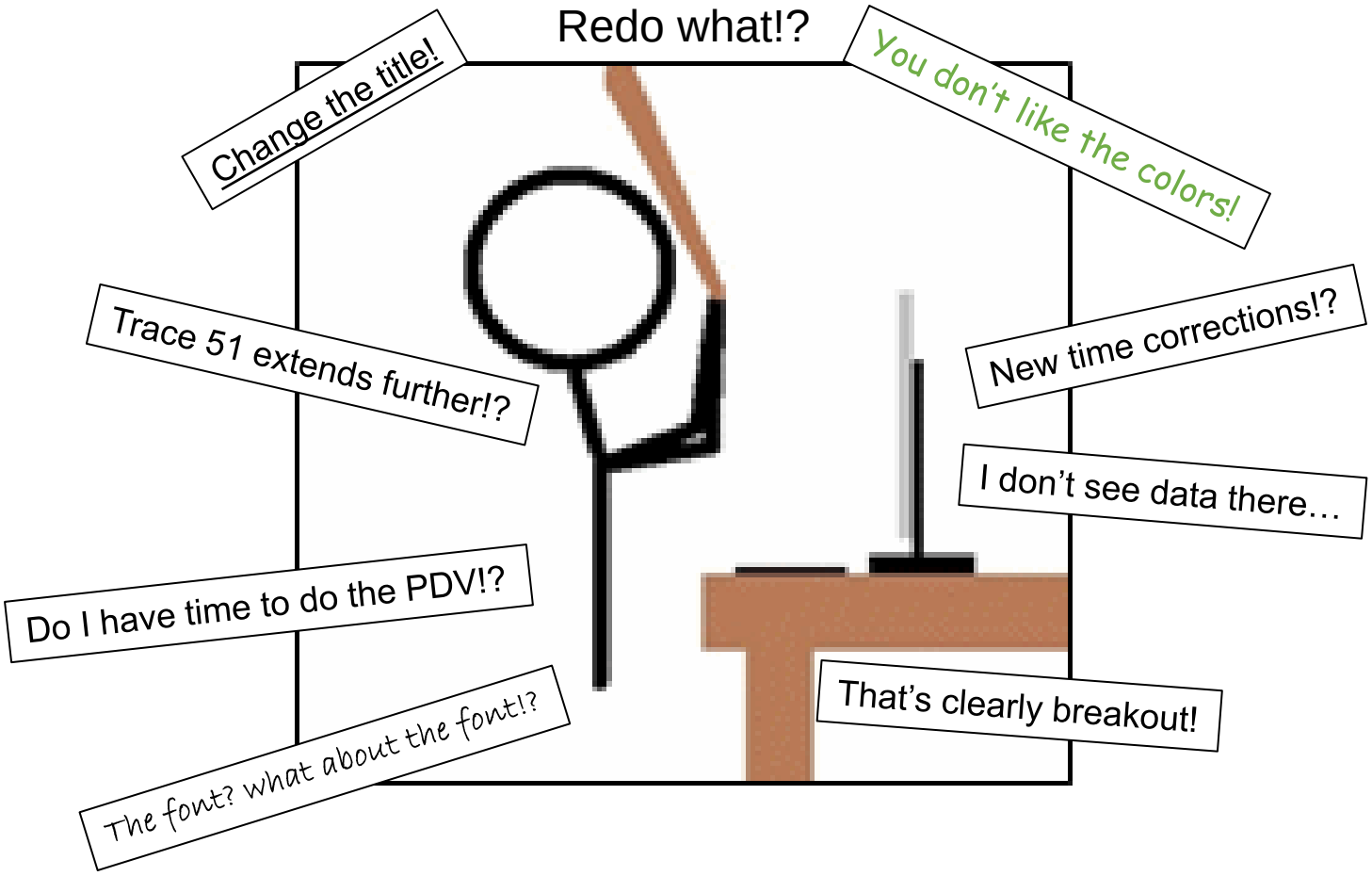
Increased accuracy

Increased productivity

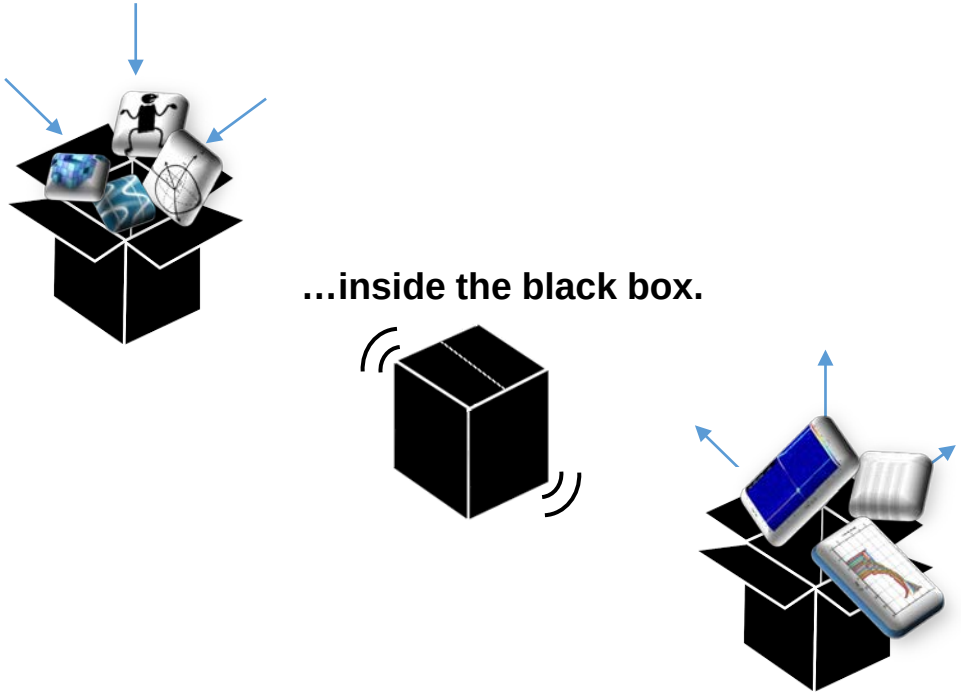
Increased turnaround



The analysis is never complete the first time…or the second time…



In summary, MPDV analysis is complex but we have made it manageable...



Thanks to Marylesa Howard, Patrick Younk, Matt Briggs, and David Holtkamp