Spatial Re-sampling to Evaluate Optimum Receiver Spacing for MEMS Microphone Array – Appendices I, II, and III

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Park Seismic LLC

Seismic Approach to Quality Management of HMA

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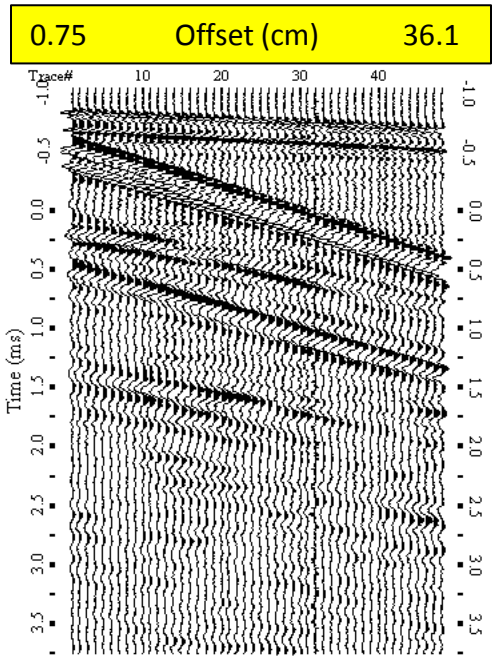
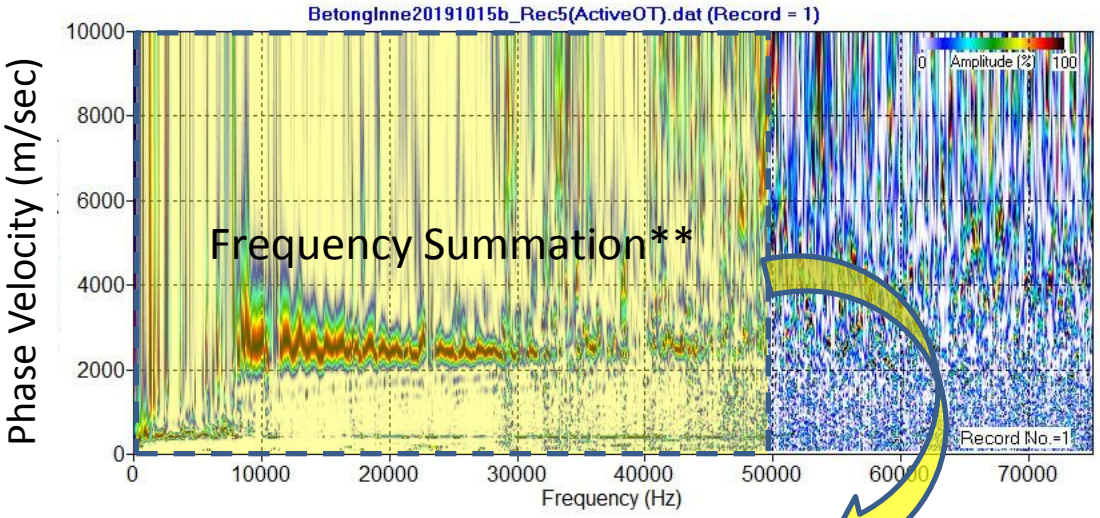
Administrative Staff*:* ***Jin Park****, Park Seismic LLC, Shelton, Connecticut, USA*

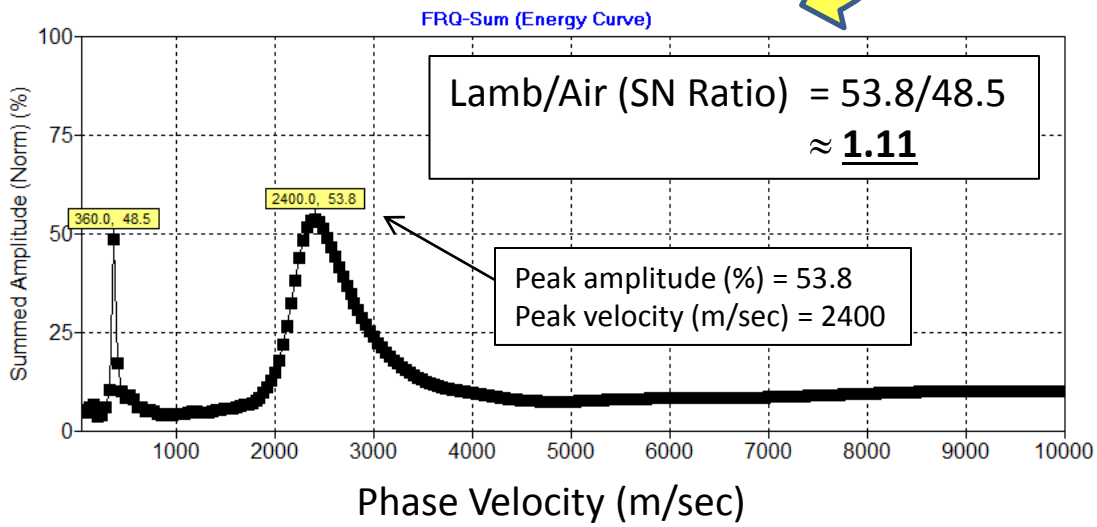
Table of Contents

Appendix I:
Simple Re-sampling (Decimation)

Full 48-Channel Record (dx* = 0.752 cm)



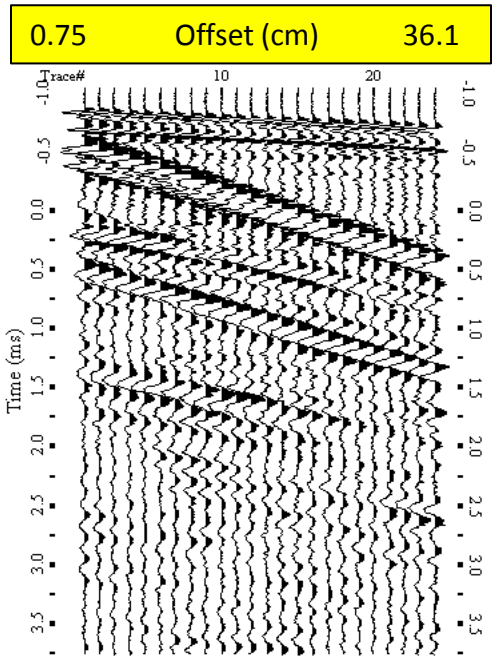


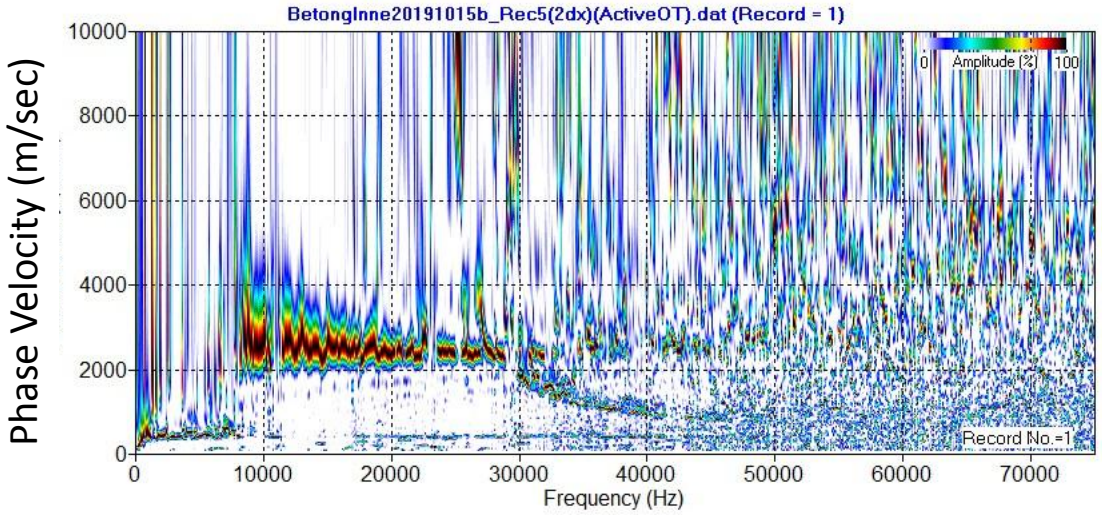


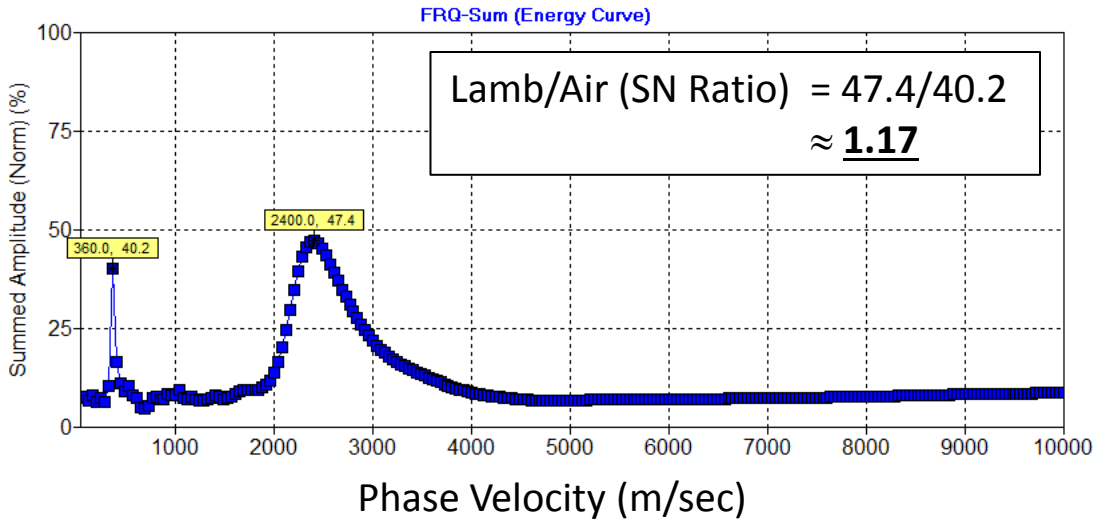
***MEMS microphone spacing.**

****Summation of wavefield energy along the frequency axis in 0.1 Khz – 50 Khz that generates a "Summed Amplitude" curve displayed on the right.**

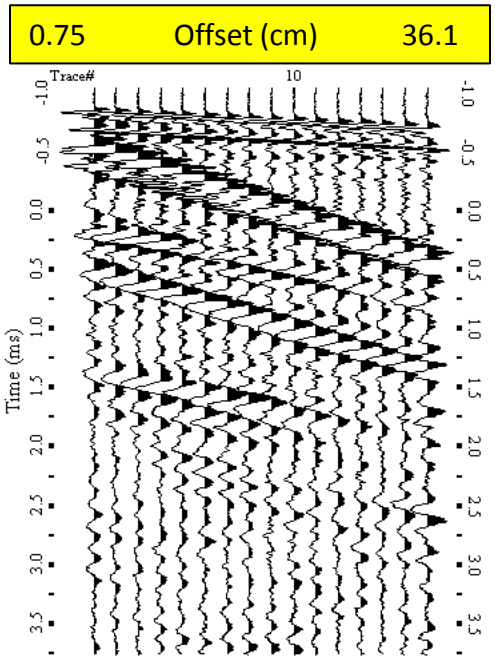
Re-sampled (24-Channel) Record (2dx = 1.504 cm)

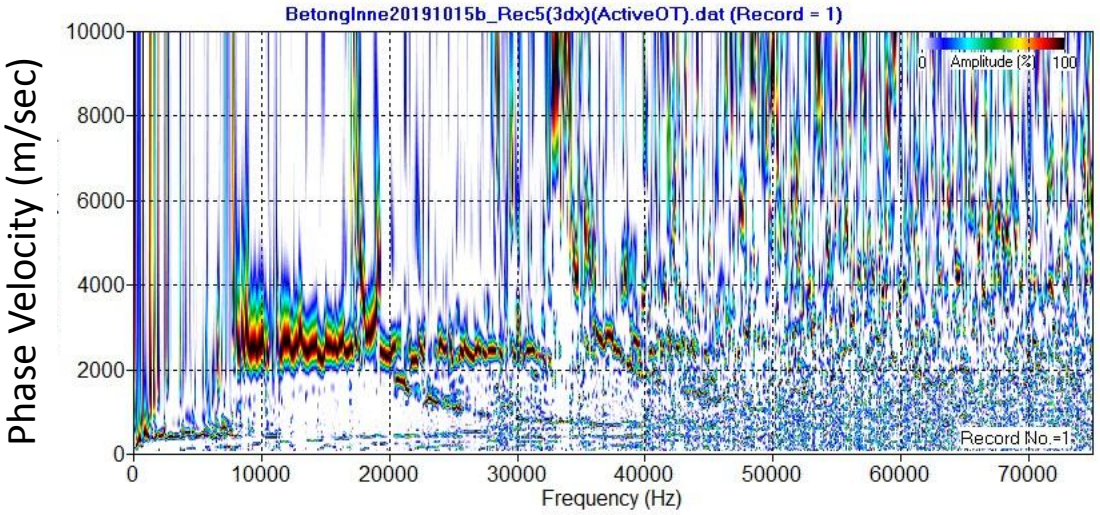


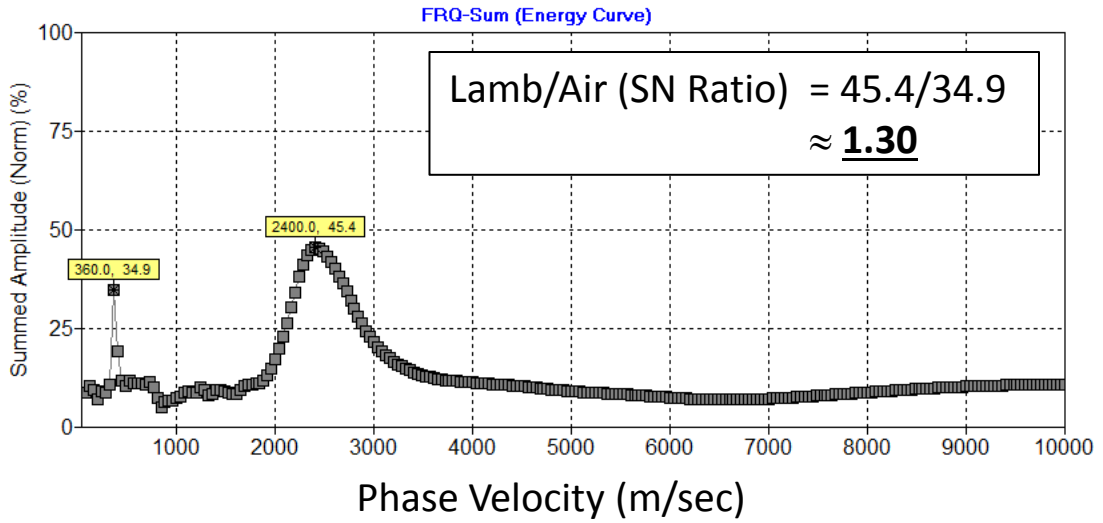




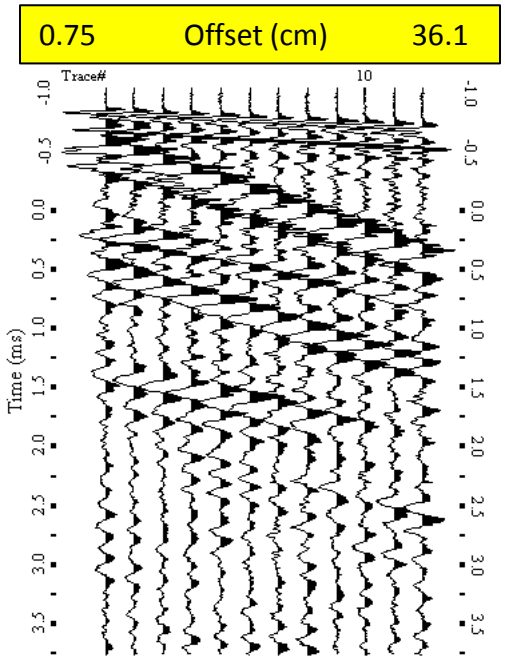
Re-sampled (16-Channel) Record (3dx = 2.256 cm)

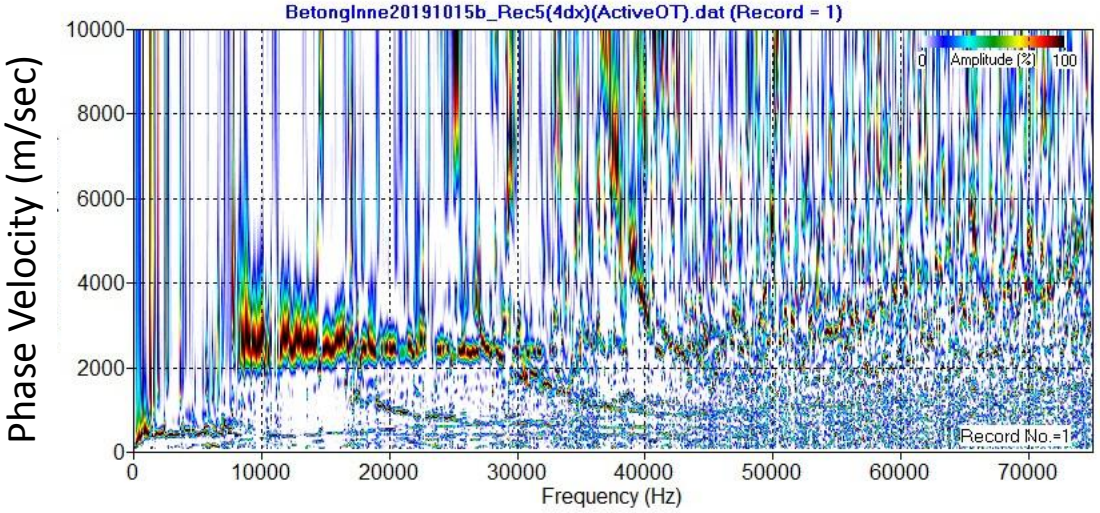


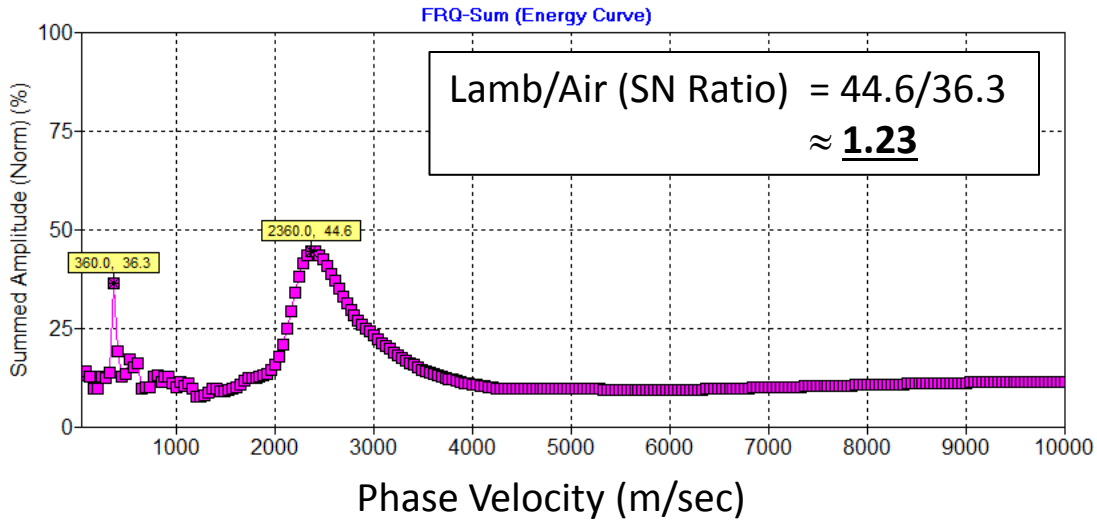




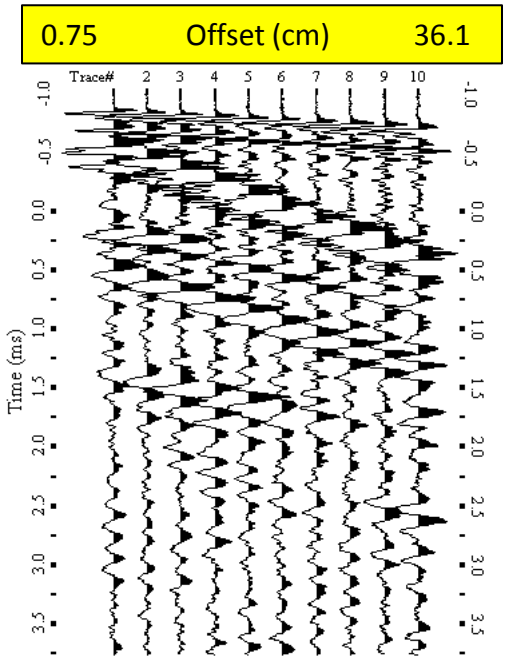
Re-sampled (12-Channel) Record (4dx = 3.008 cm)

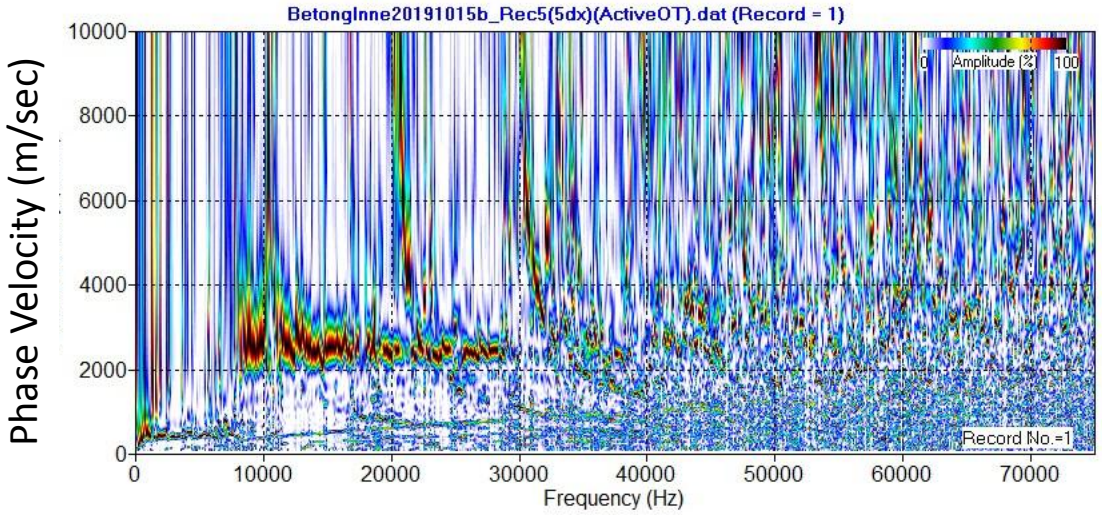


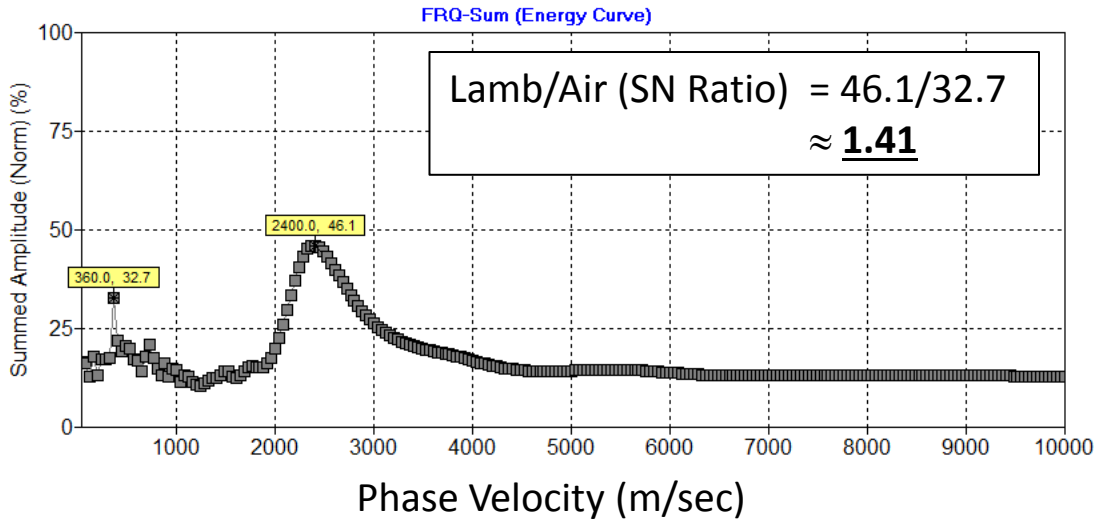




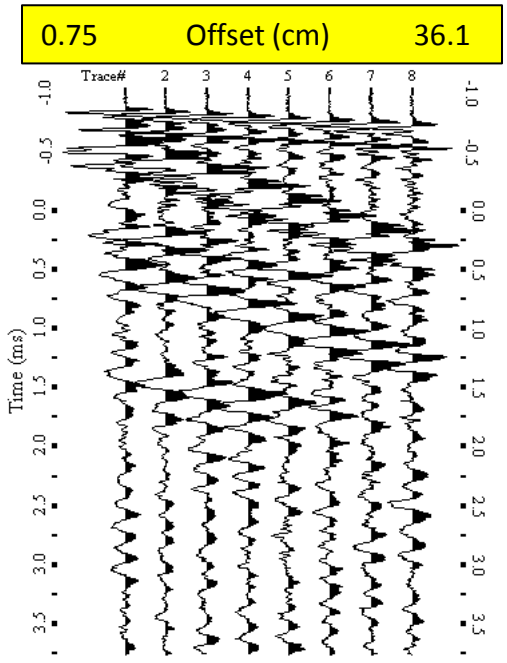
Re-sampled (10-Channel) Record (5dx = 3.760 cm)

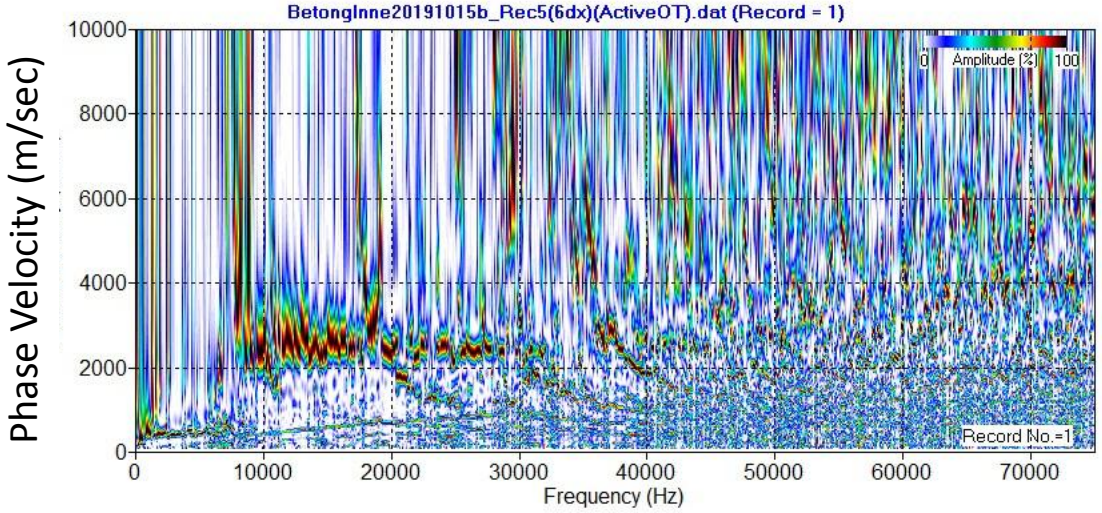


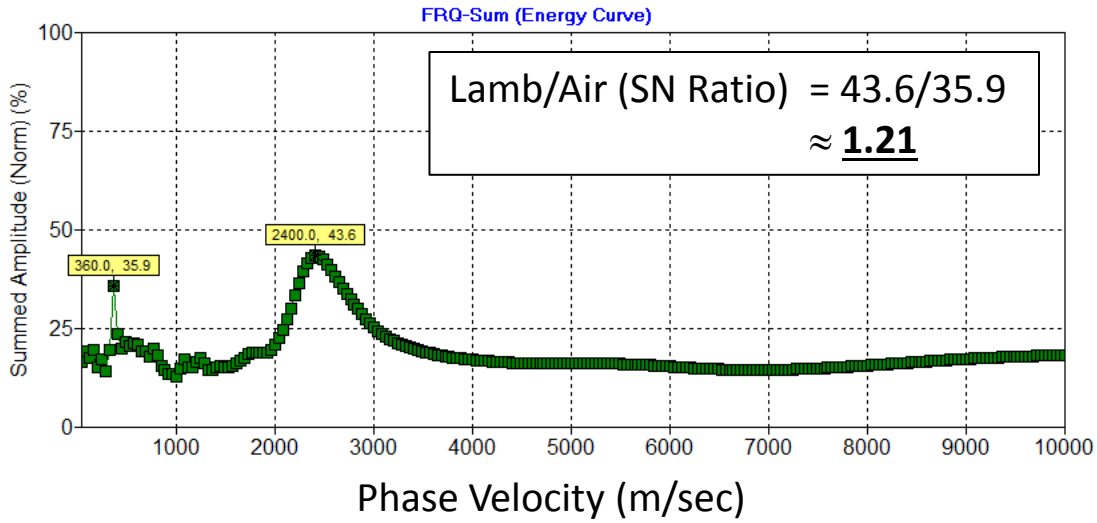




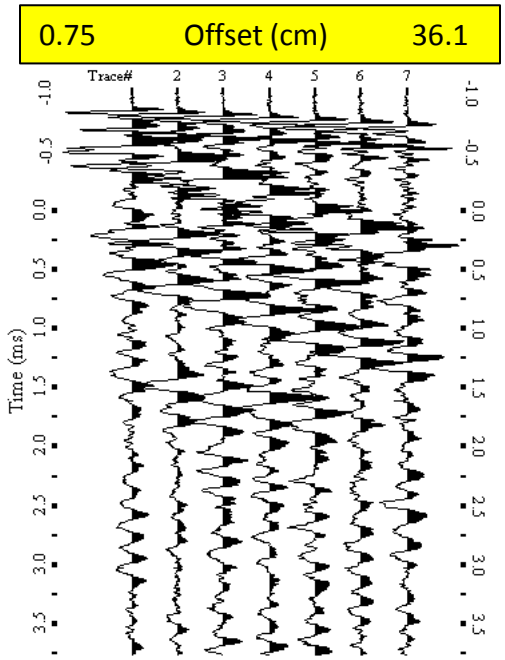
Re-sampled (8-Channel) Record (6dx = 4.512 cm)

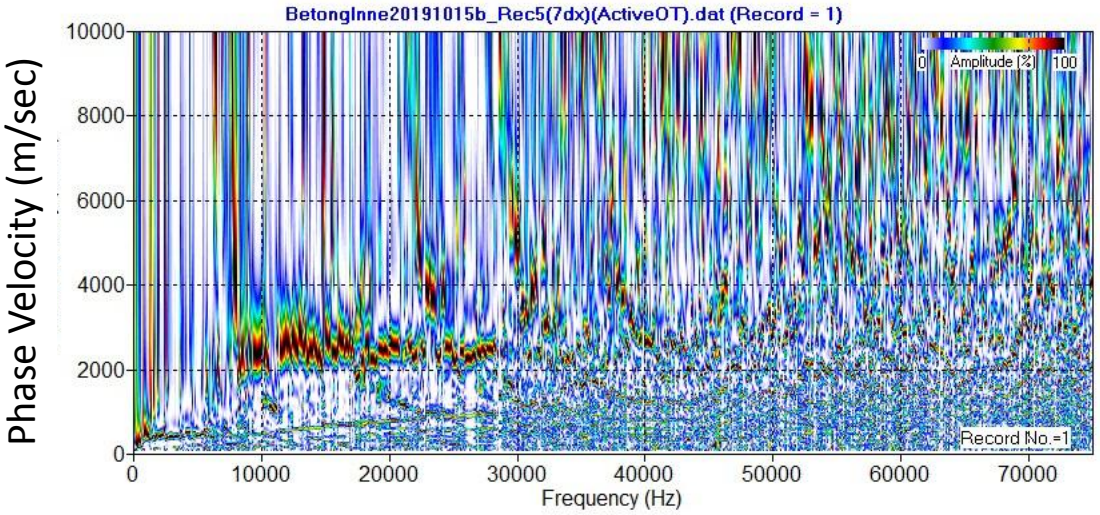


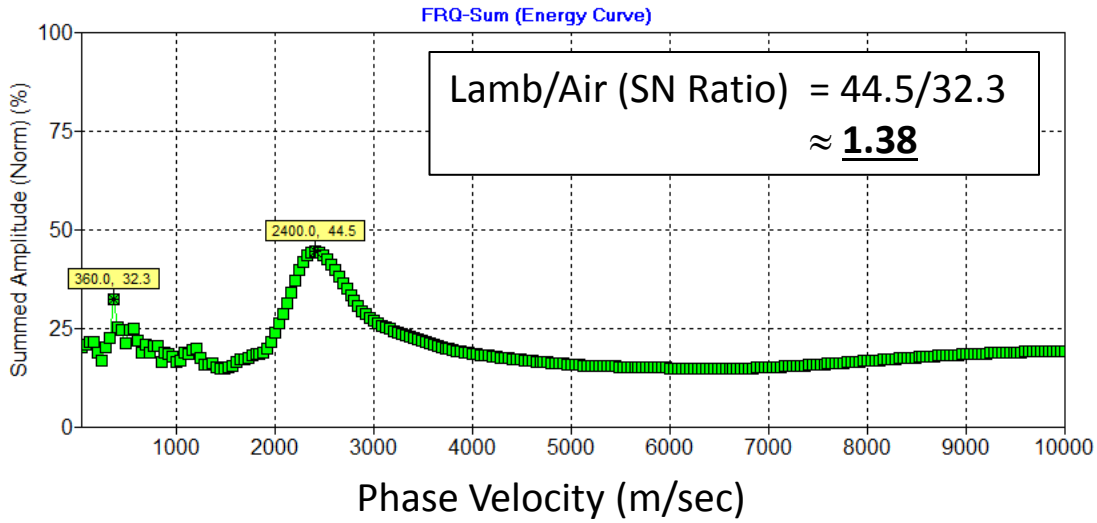




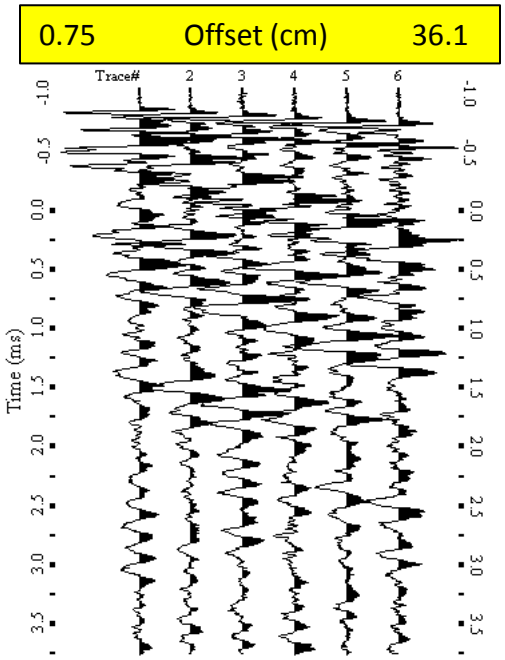
Re-sampled (7-Channel) Record (7dx = 5.264 cm)

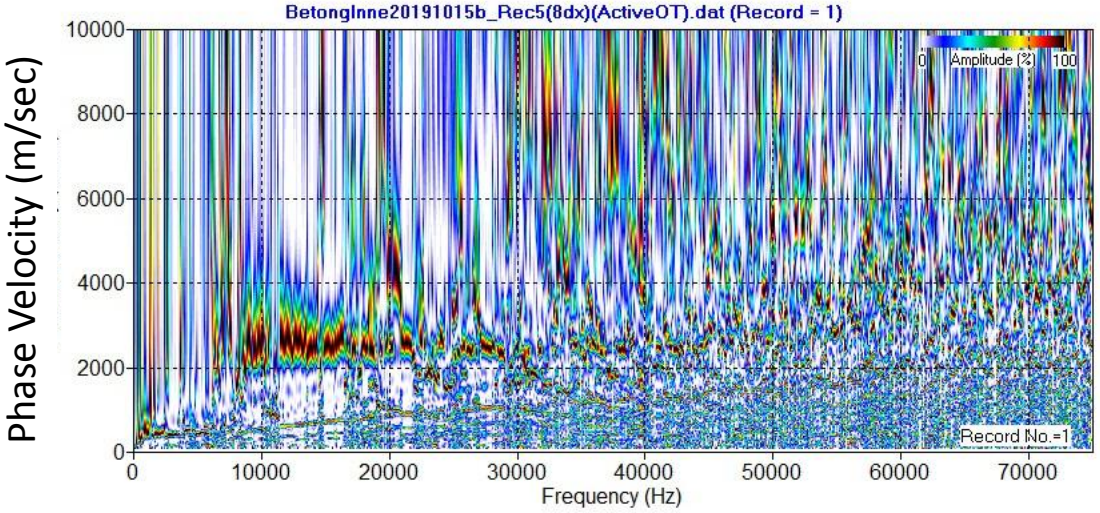


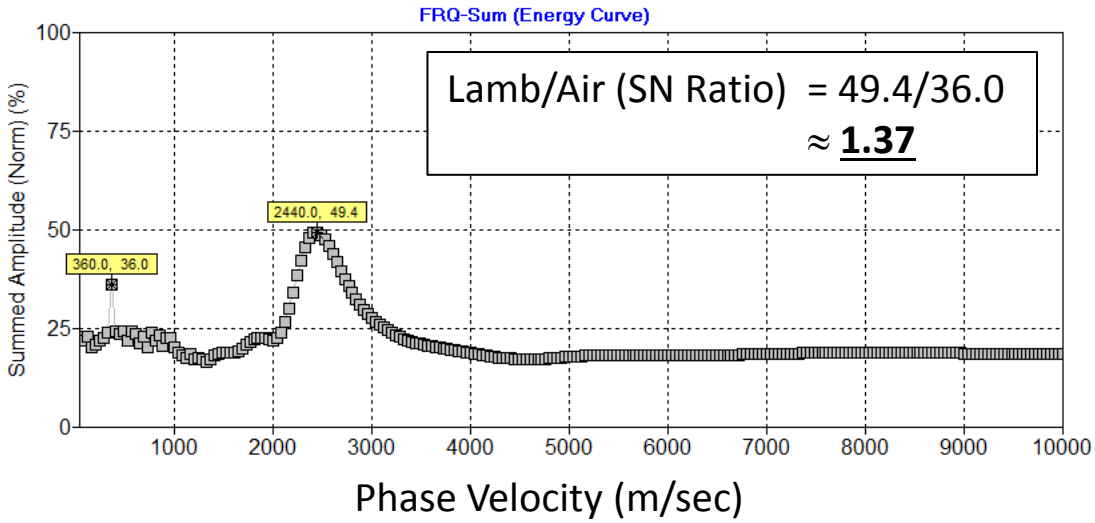




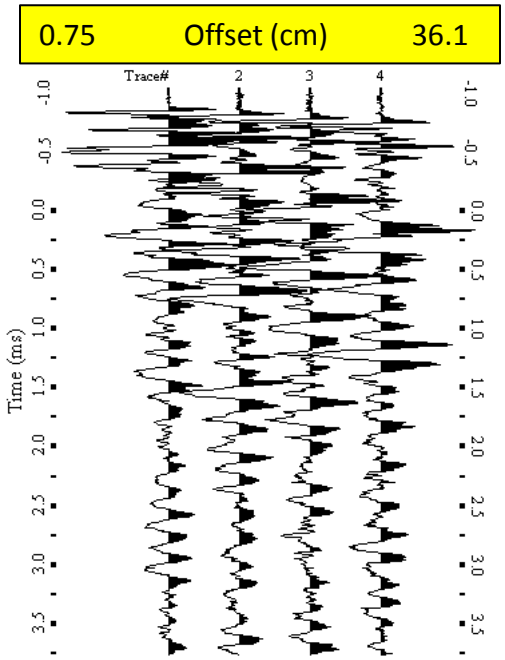
Re-sampled (6-Channel) Record (8dx = 6.016 cm)

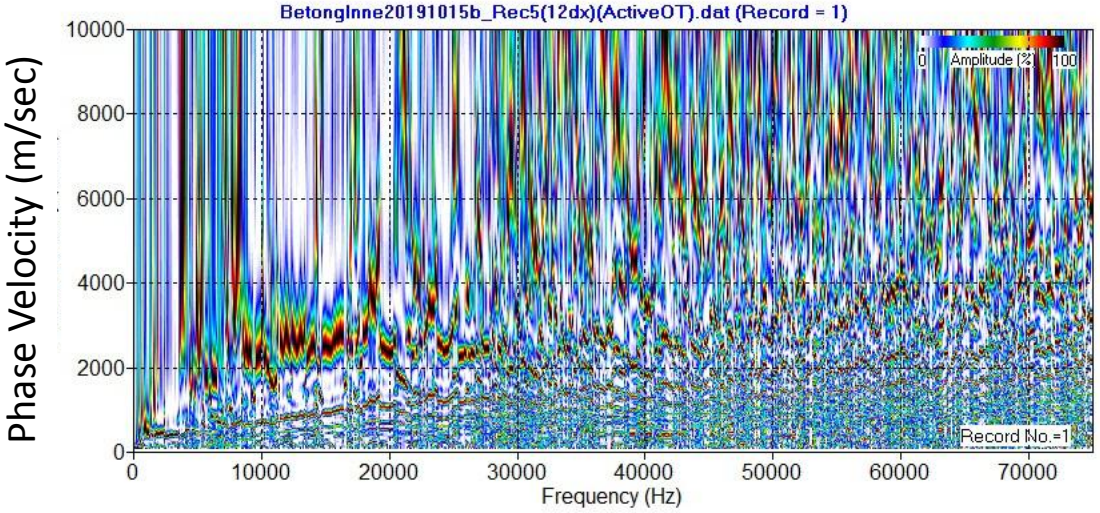


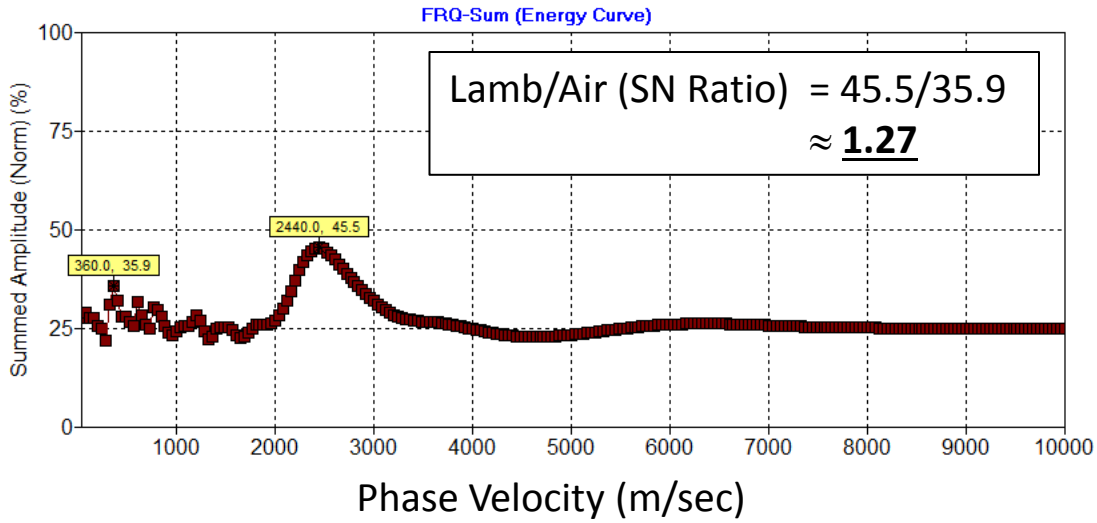




Re-sampled (4-Channel) Record (12dx = 9.024 cm)

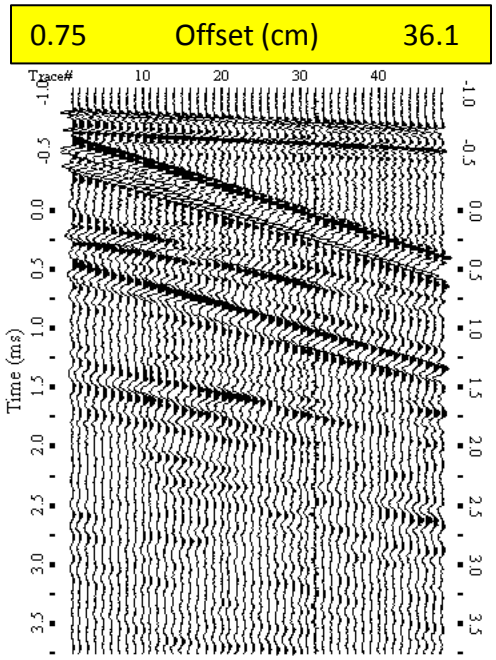


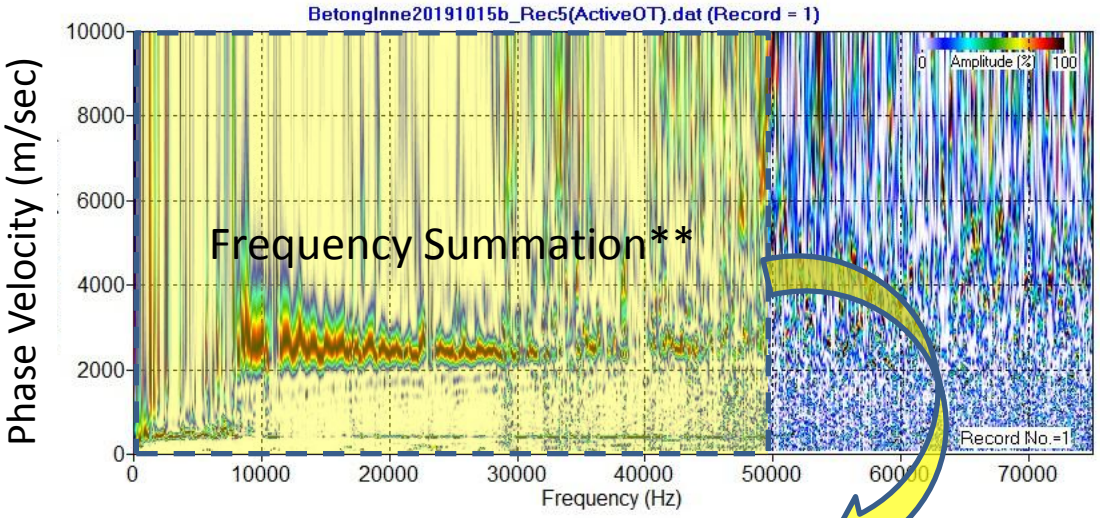


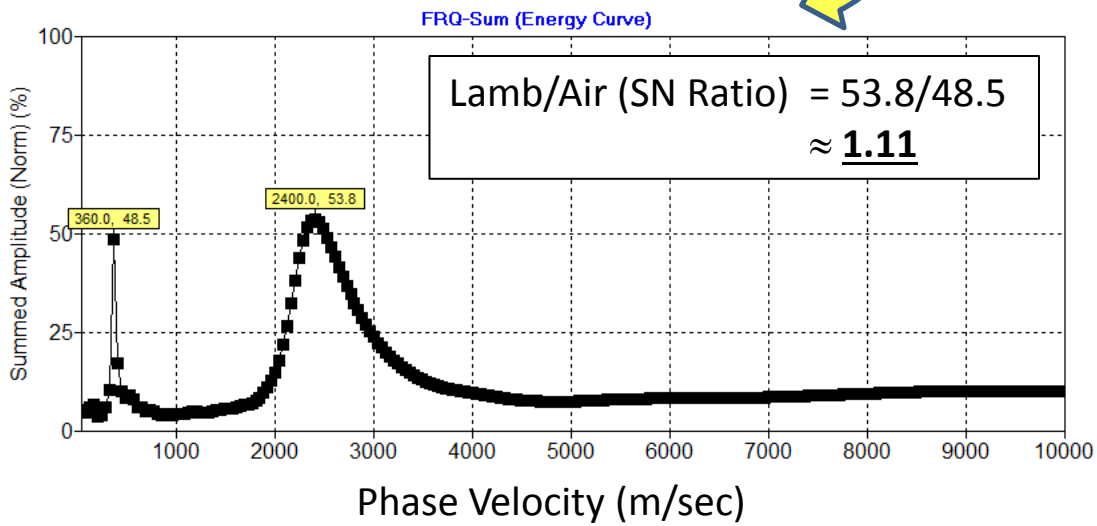


Appendix II:
Stack-Re-sampling

Full 48-Channel Record (dx* = 0.752 cm)



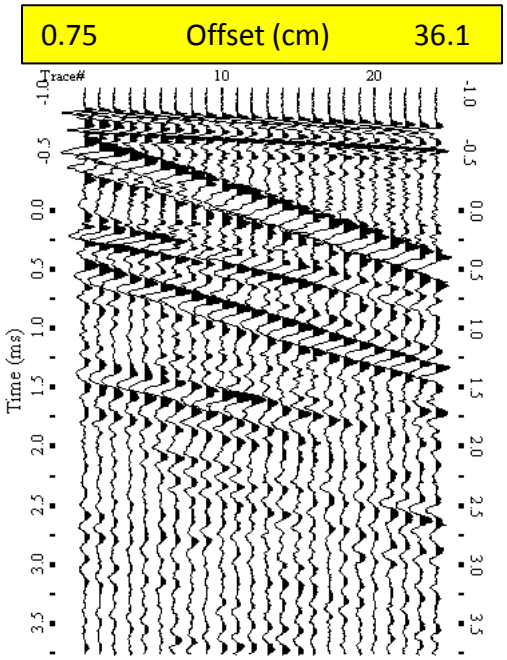


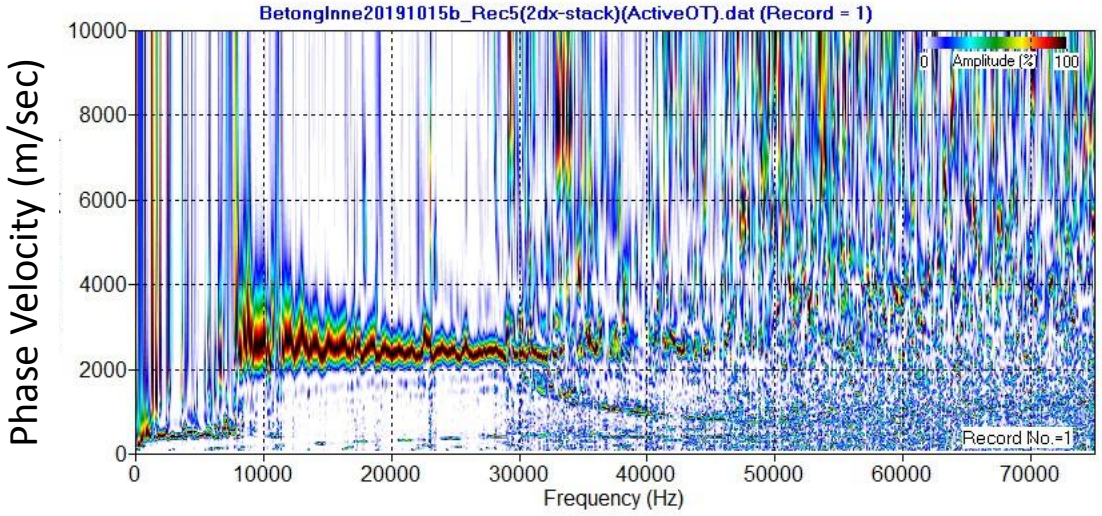


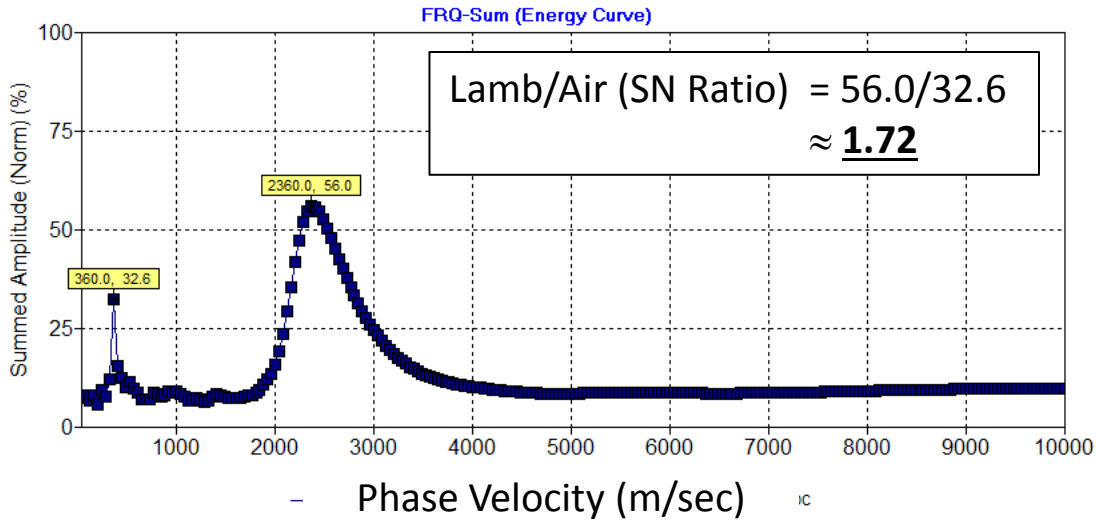
***MEMS microphone spacing.**

****Summation of wavefield energy along the frequency axis that generates a "Summed Amplitude" curve displayed on the right.**

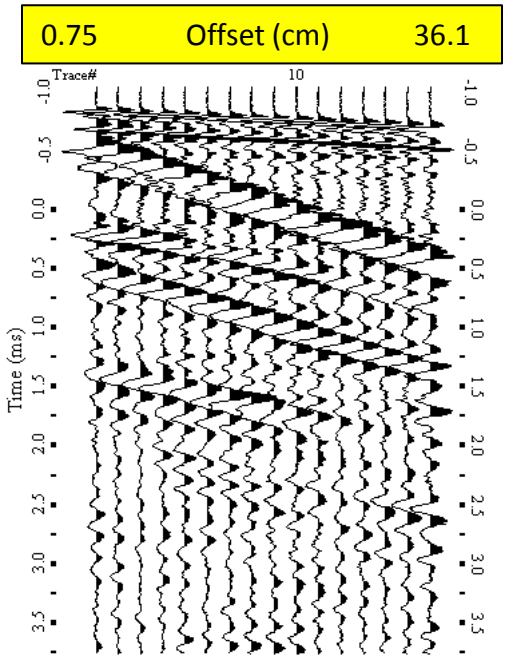
Stack-Re-sampled (24-Channel) Record (2dx = 1.504 cm)

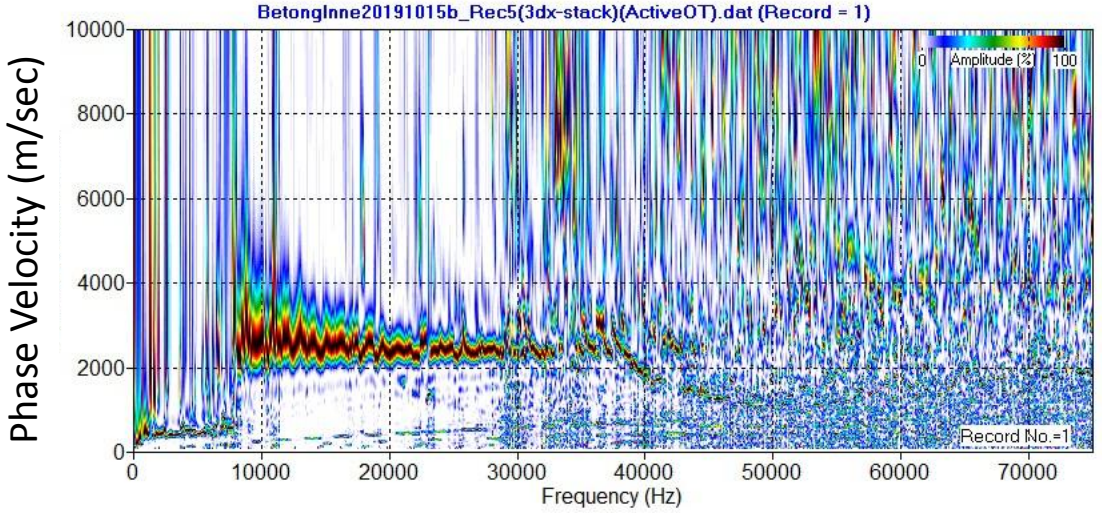


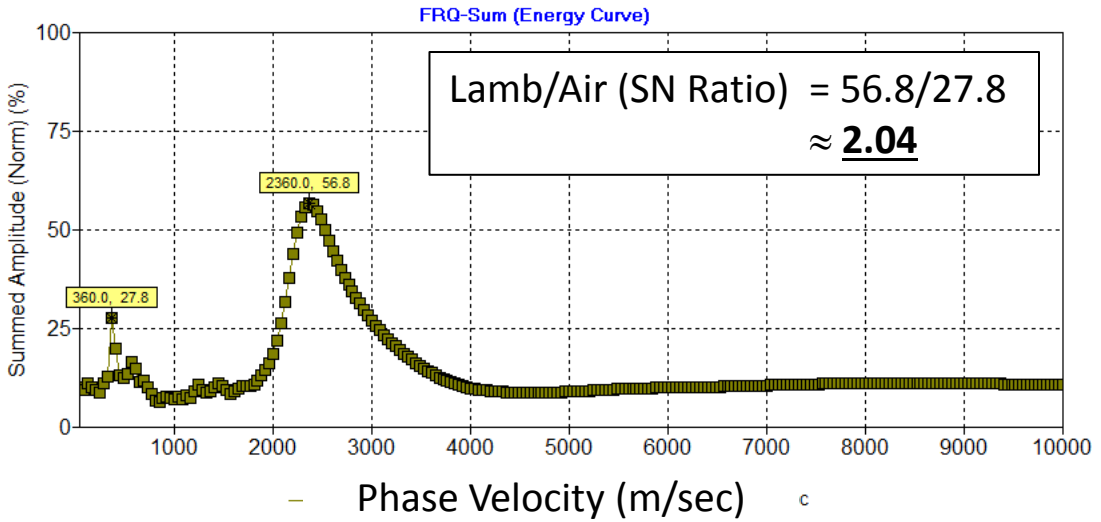




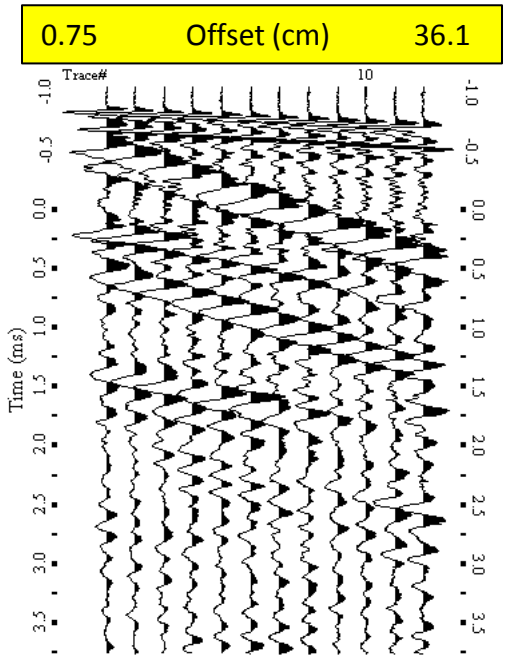
Stack-Re-sampled (16-Channel) Record (3dx = 2.256 cm)

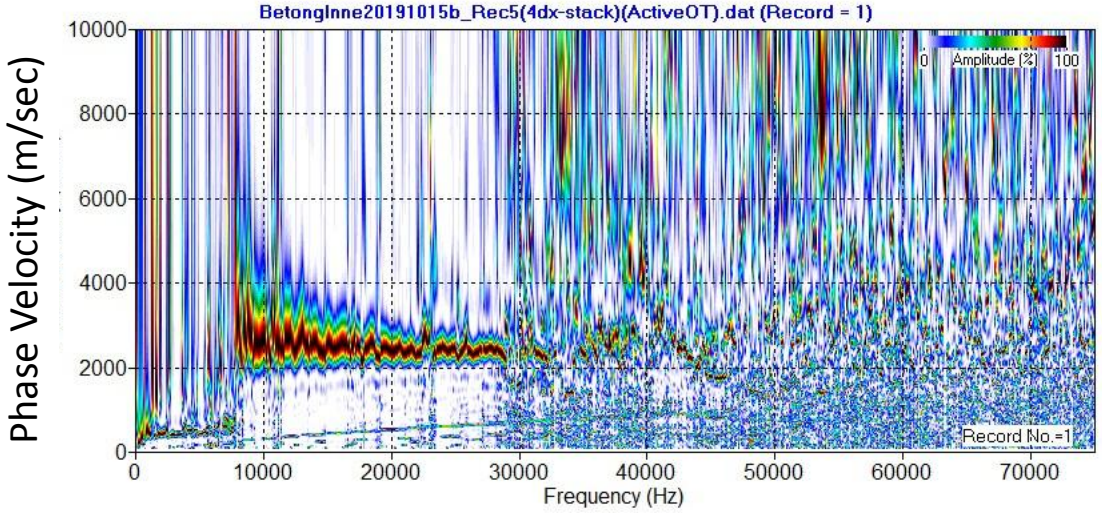


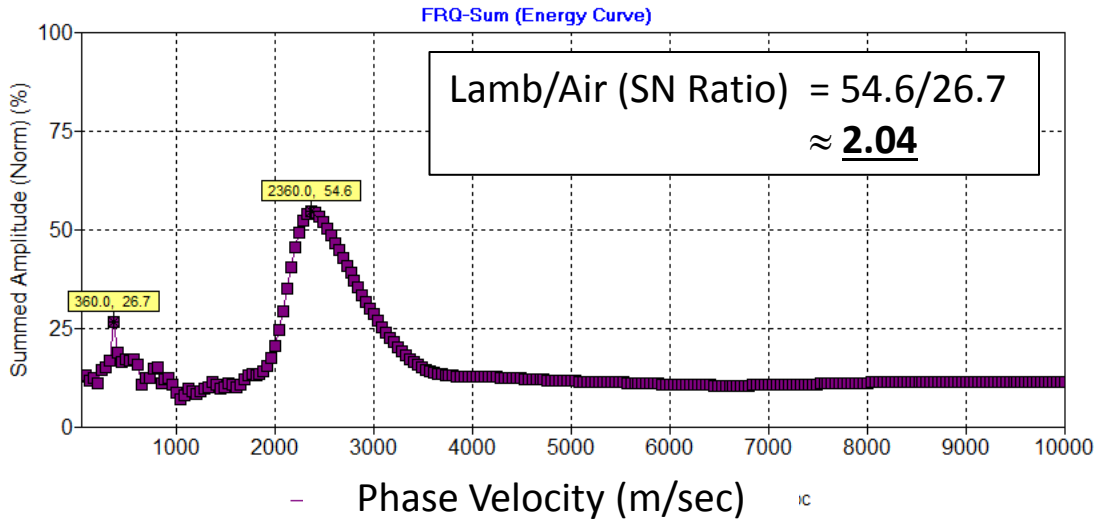




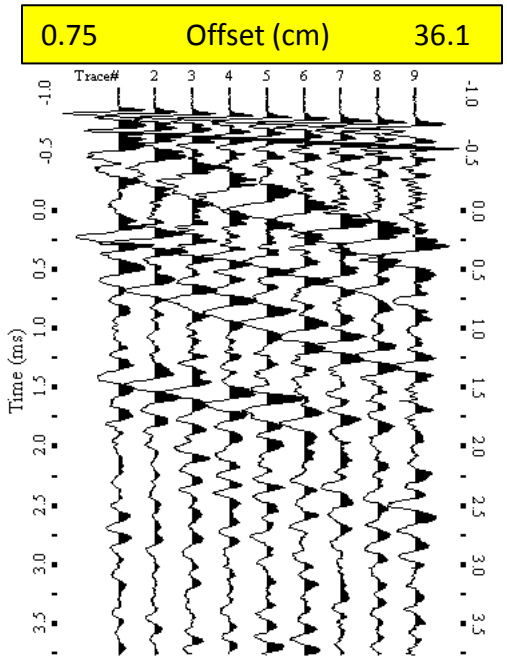
Stack-Re-sampled (12-Channel) Record (4dx = 3.008 cm)

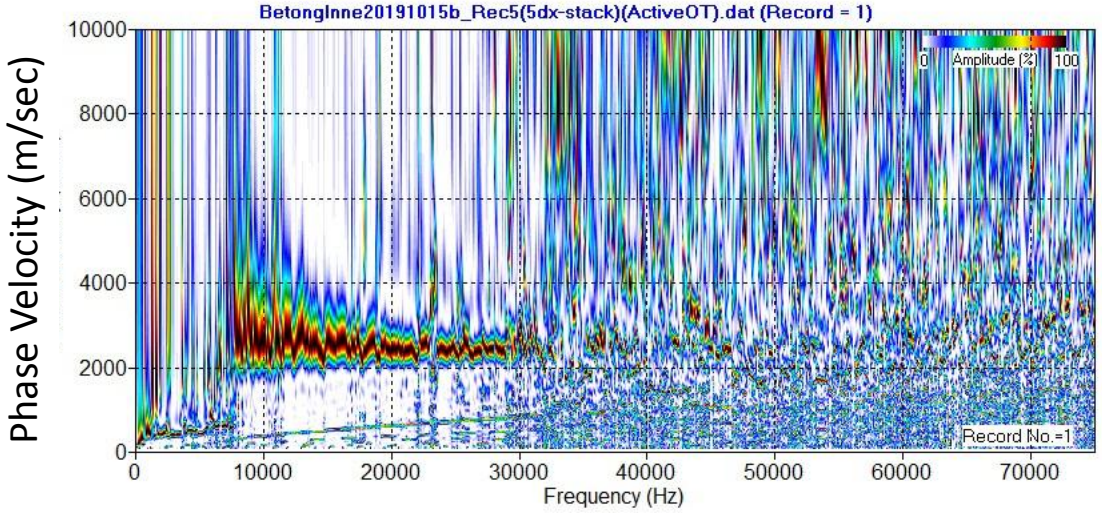


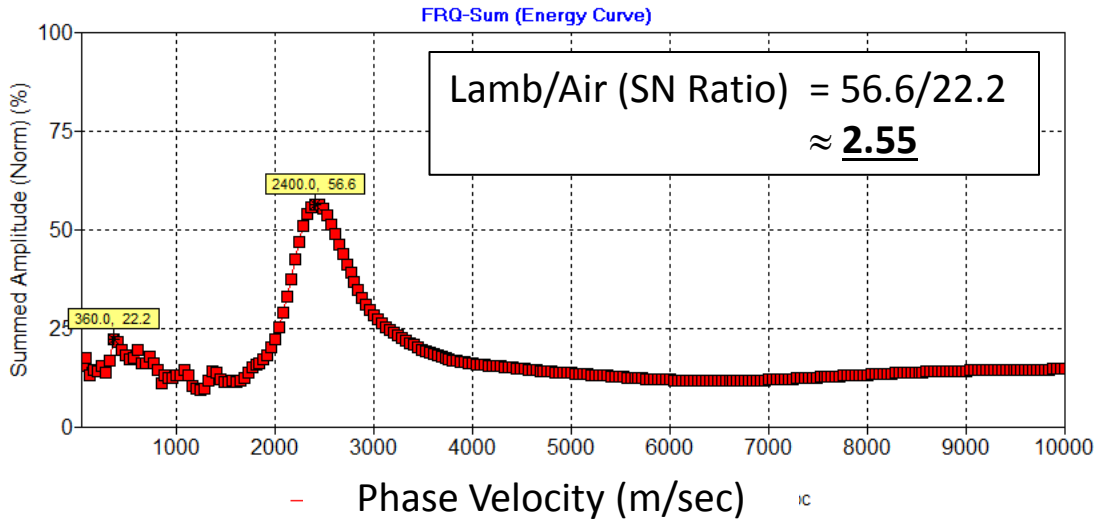




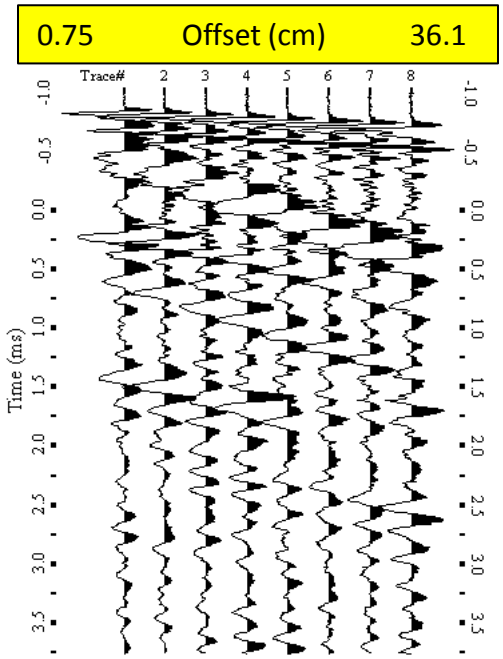
Stack-Re-sampled (9-Channel) Record (5dx = 3.760 cm)

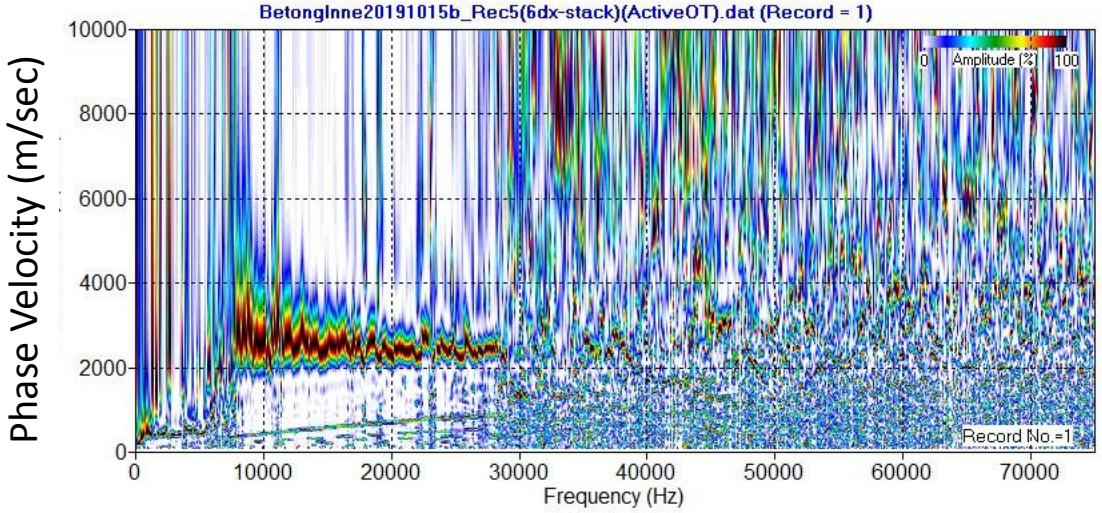


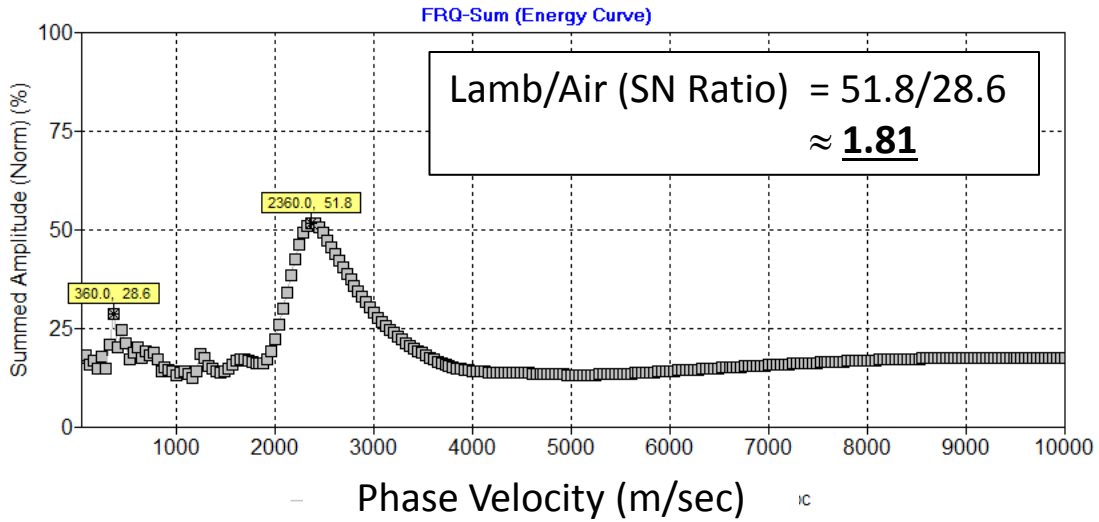




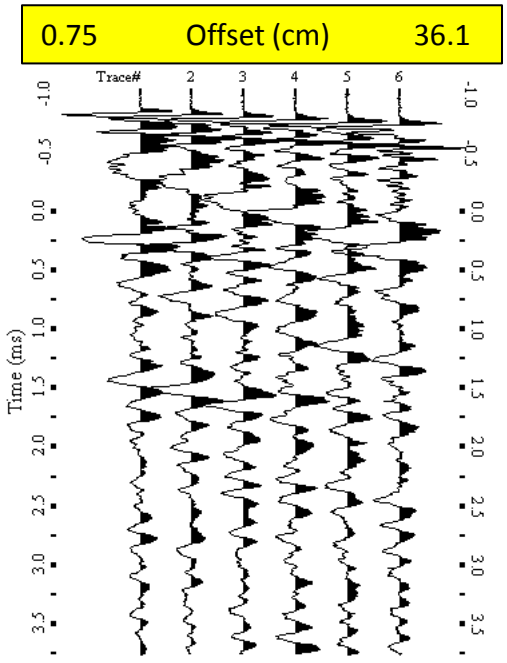
Stack-Re-sampled (8-Channel) Record (6dx = 4.512 cm)

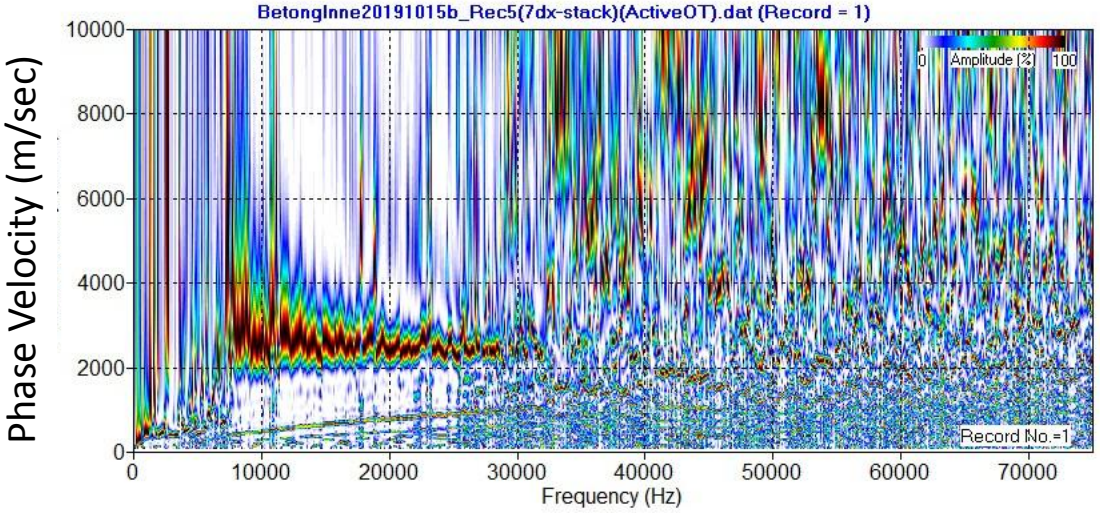


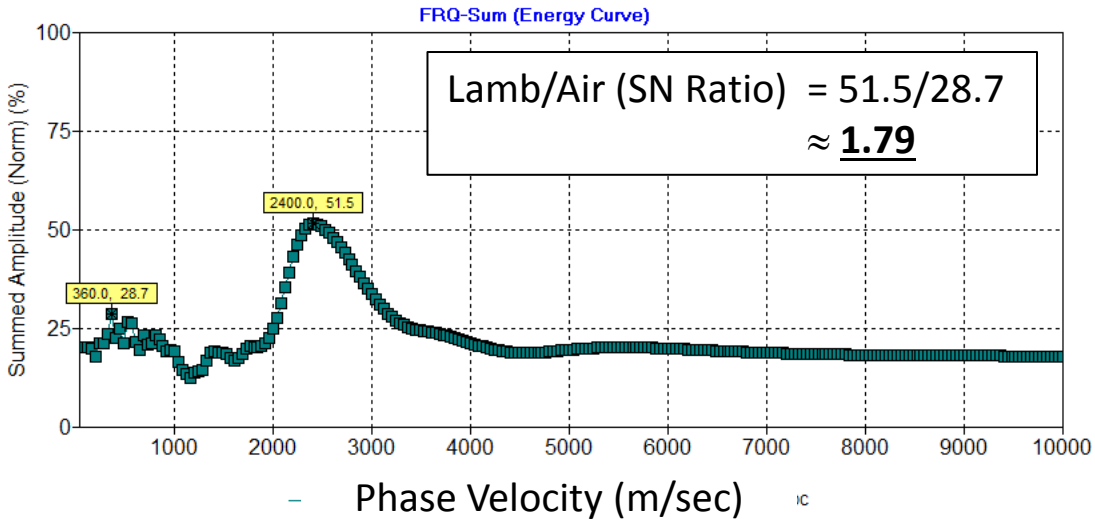




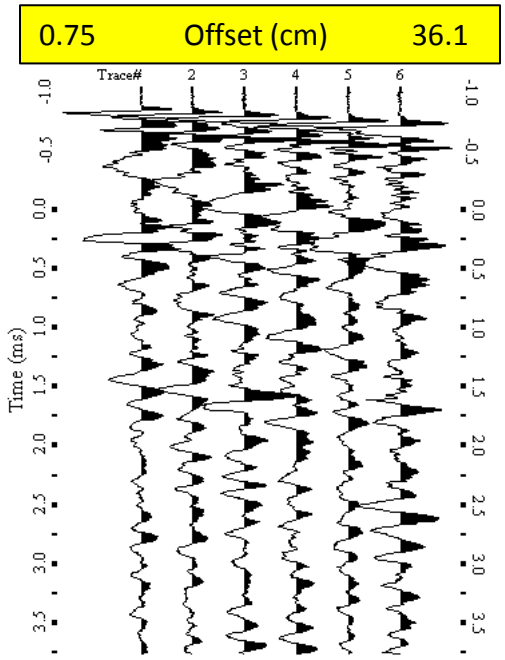
Stack-Re-sampled (6-Channel) Record (7dx = 5.264 cm)

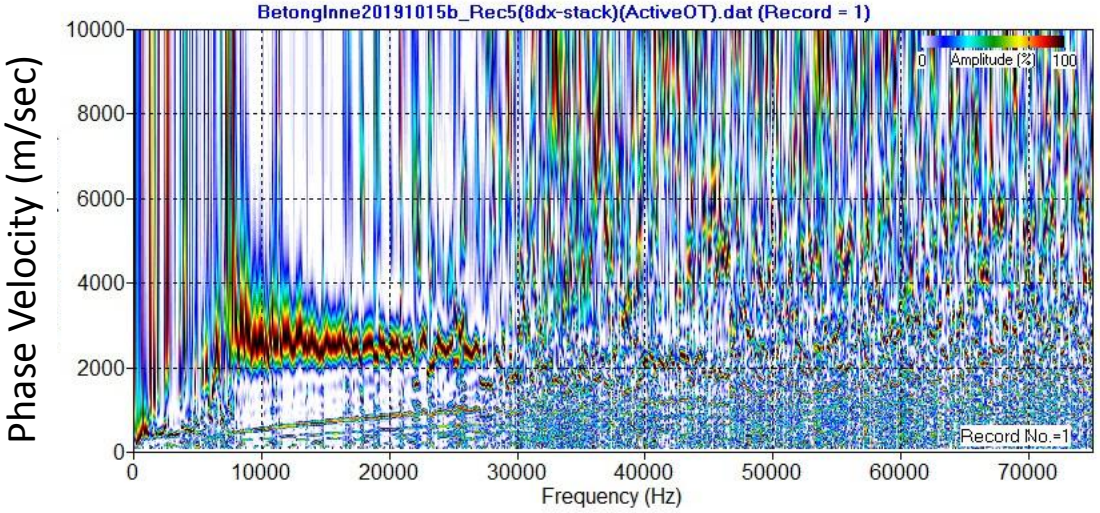


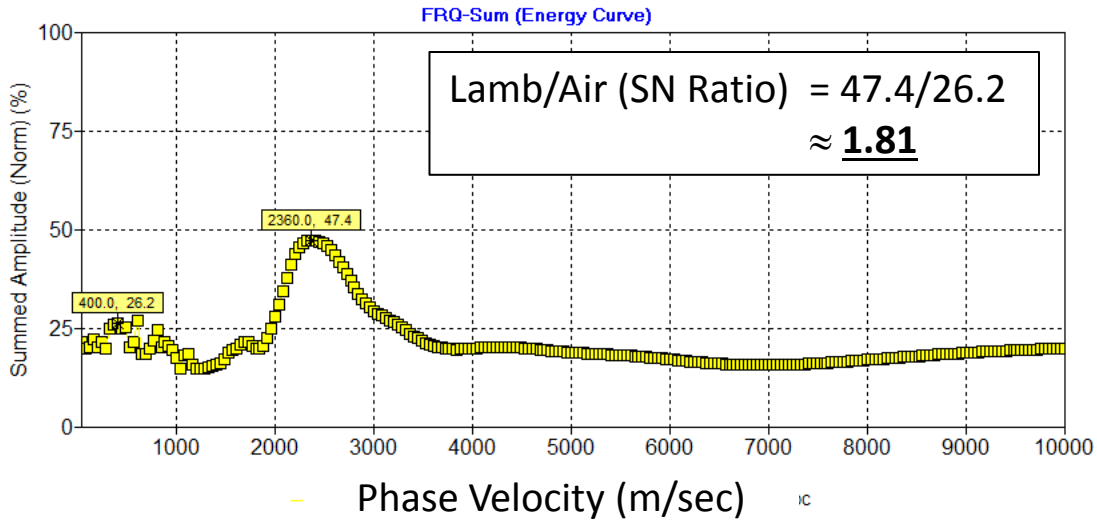




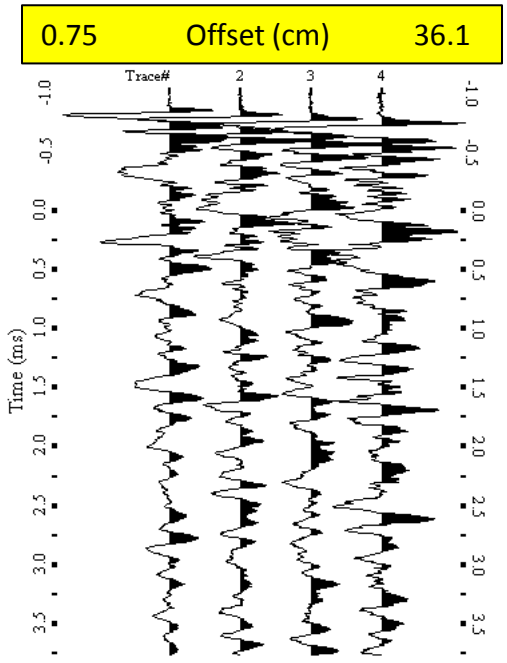
Stack-Re-sampled (6-Channel) Record (8dx = 6.016 cm)

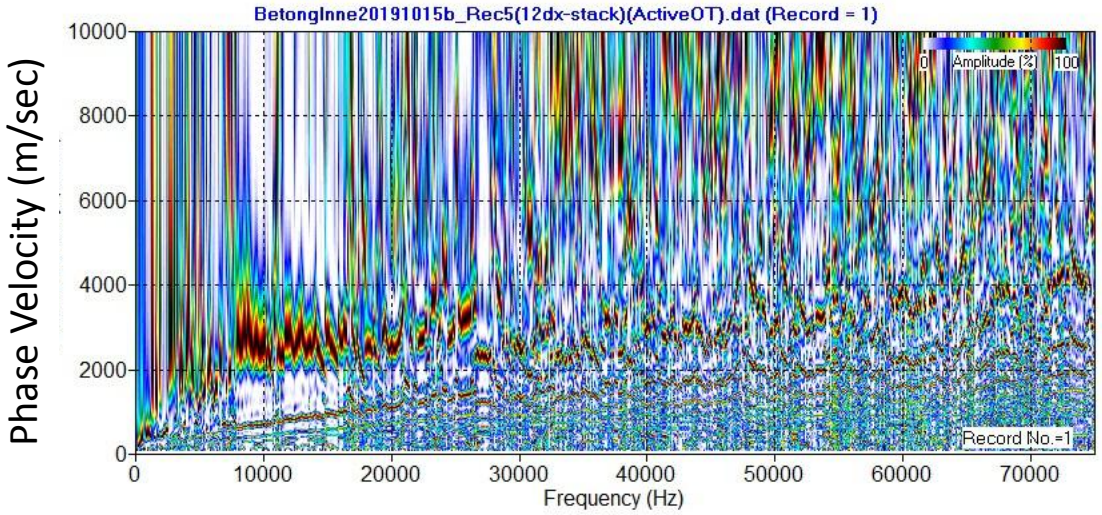


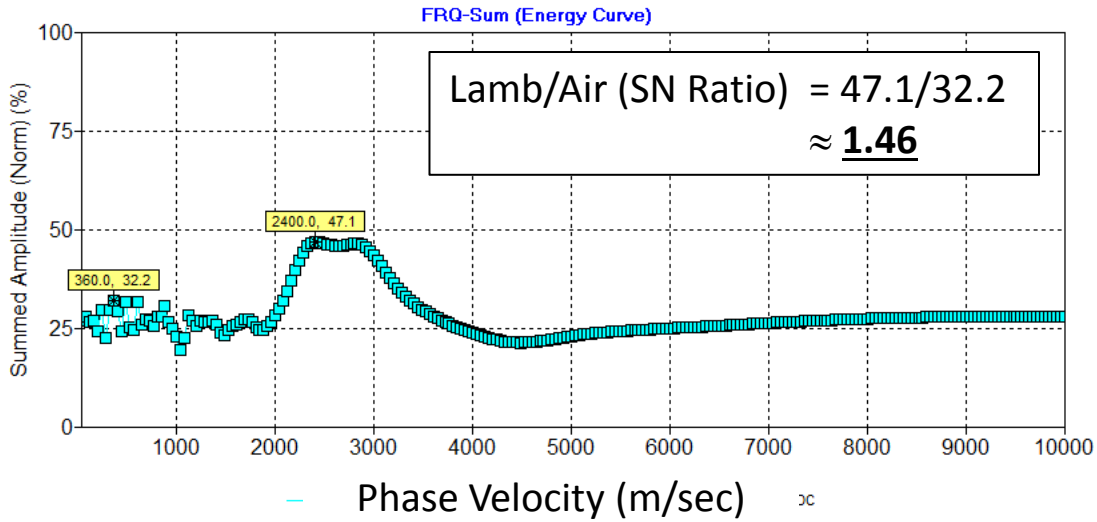




Stack-Re-sampled (4-Channel) Record (12dx = 9.024 cm)



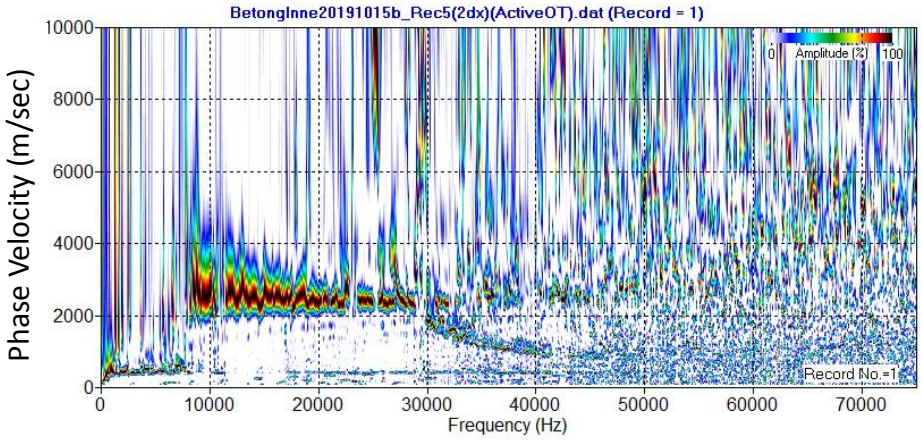


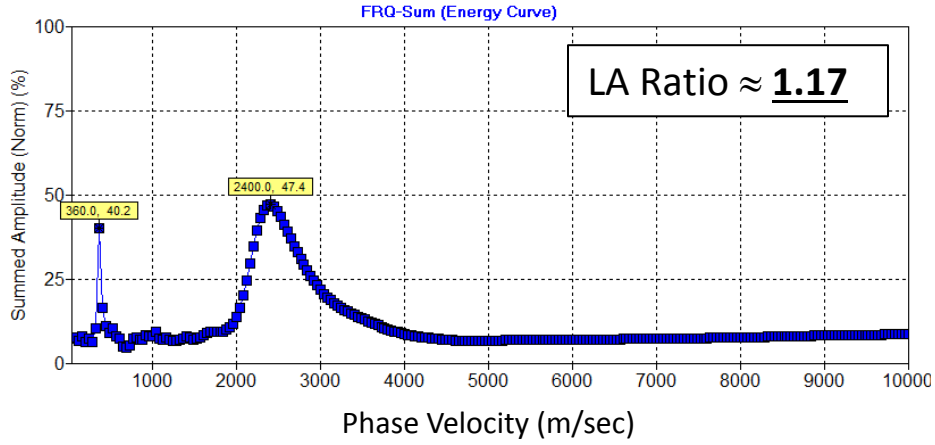


Appendix III:
Comparison of
Simple Re-sampling (Decimation)
and
Stack-Re-Sampling

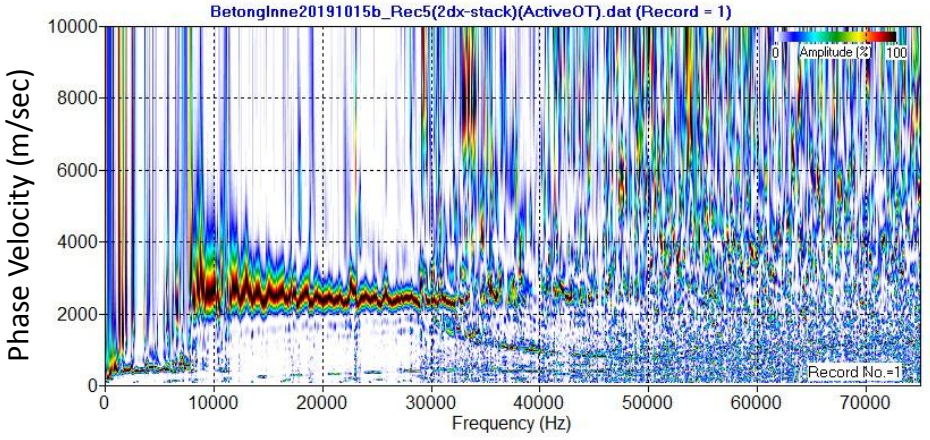
Re-sampled (24-Channel) Record (2dx = 1.504 cm)

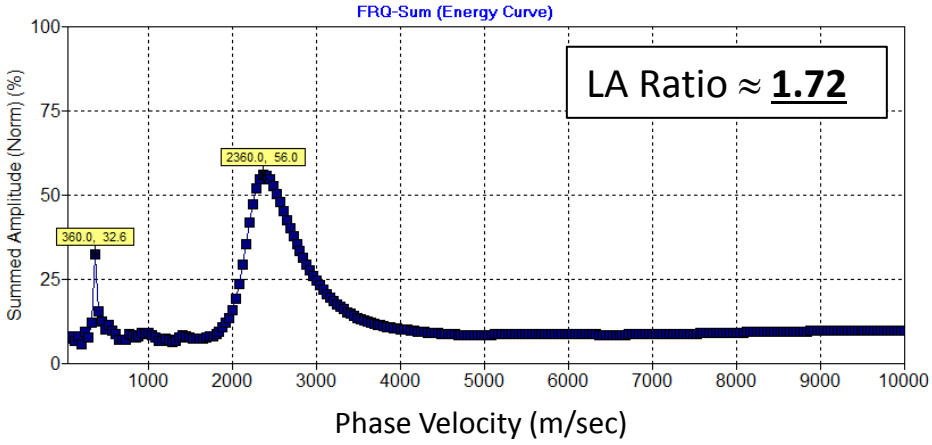
Simple Re-sample





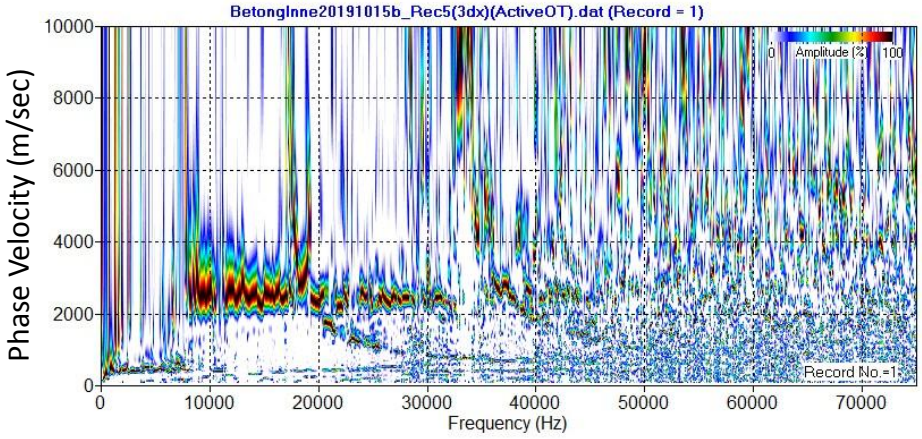
Stack-Re-sample

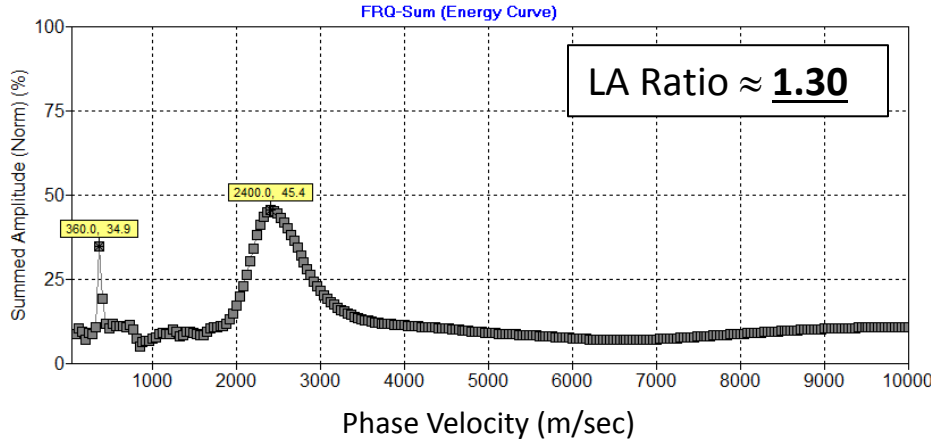




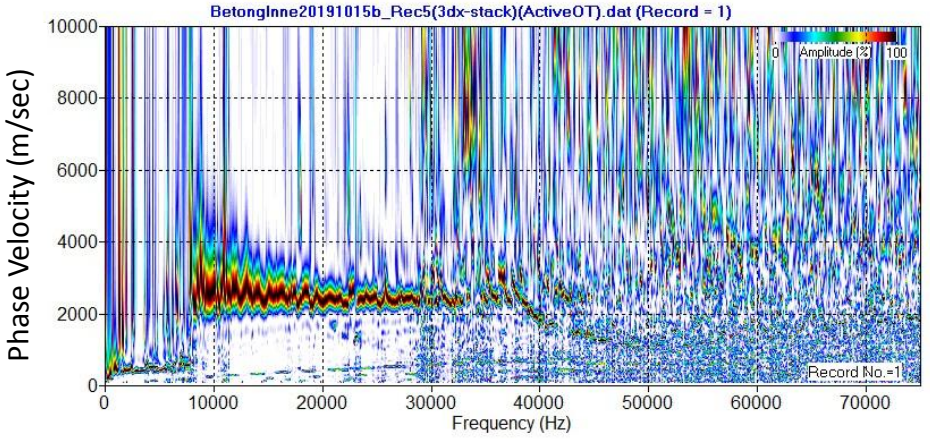
Re-sampled (16-Channel) Record (3dx = 2.256 cm)

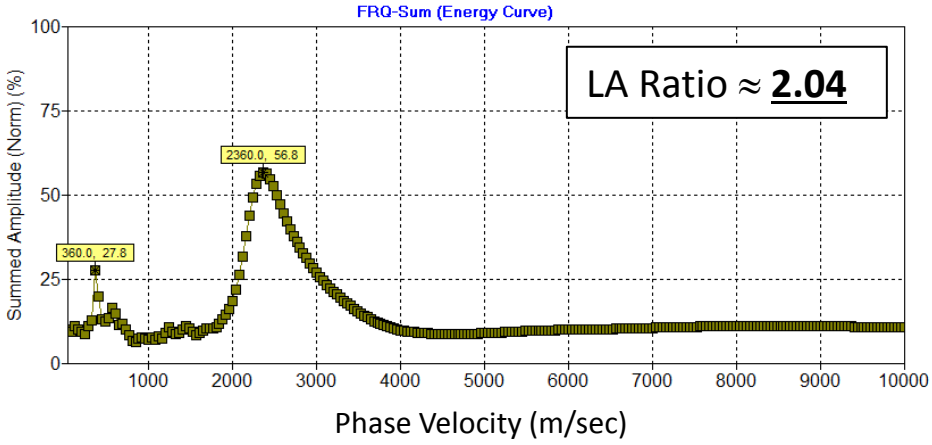
Simple Re-sample





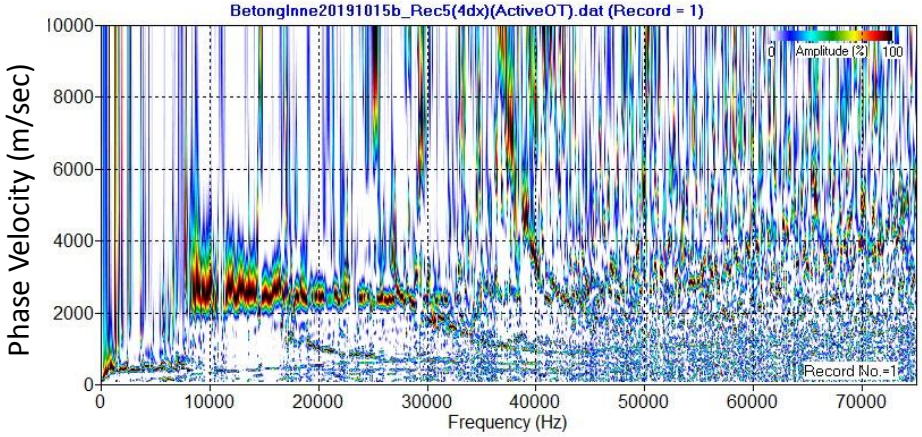
Stack-Re-sample

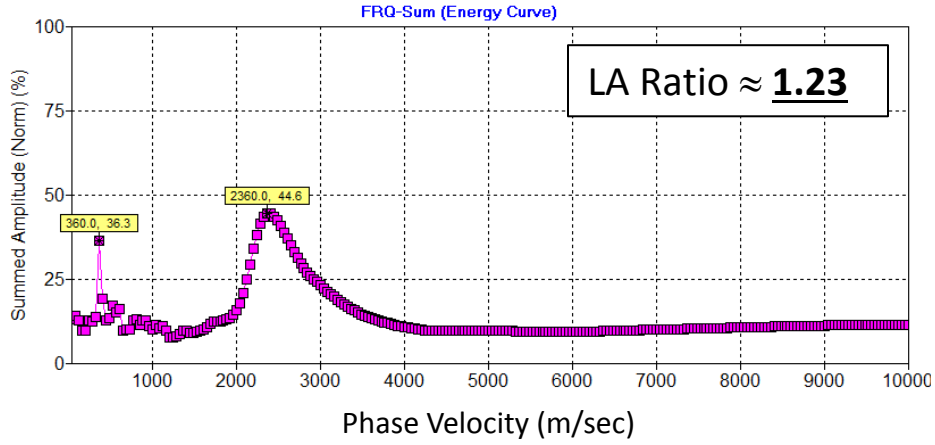




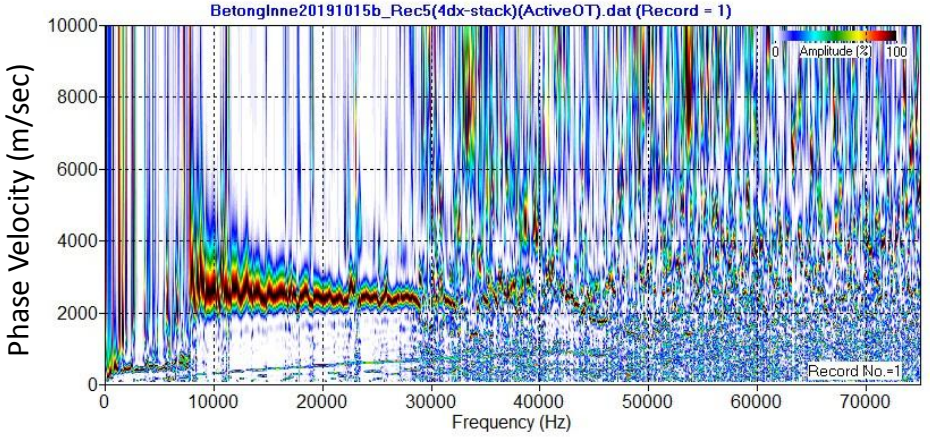
Re-sampled (12-Channel) Record (4dx = 3.008 cm)

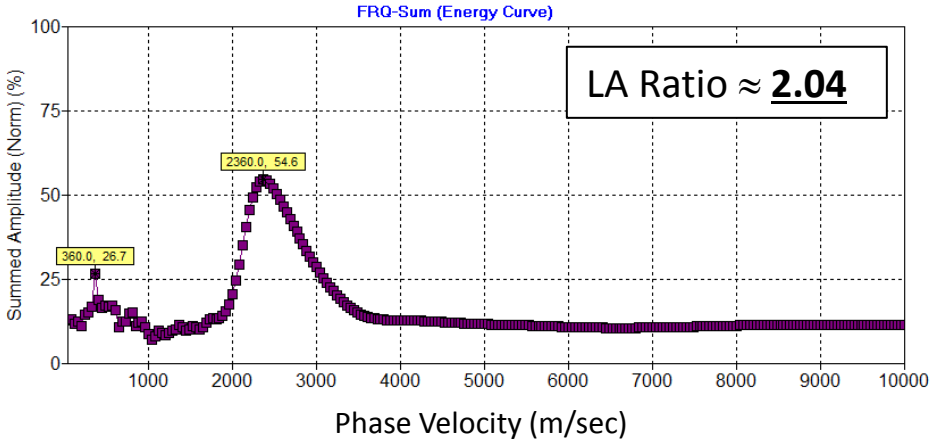
Simple Re-sample





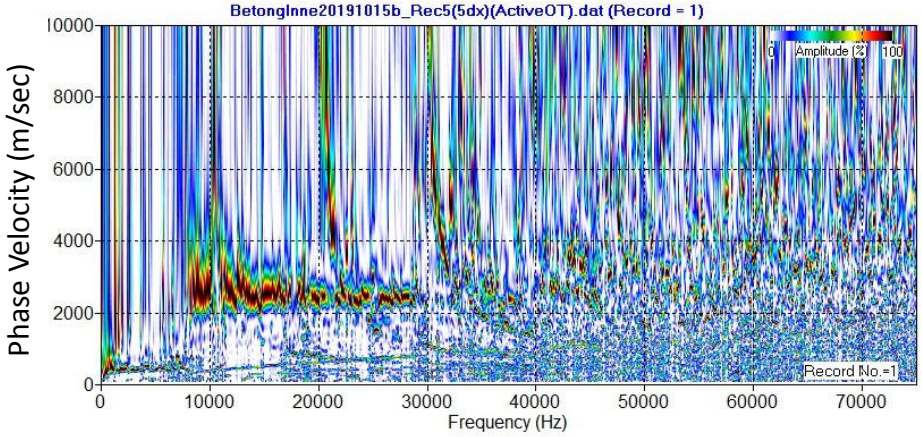
Stack-Re-sample

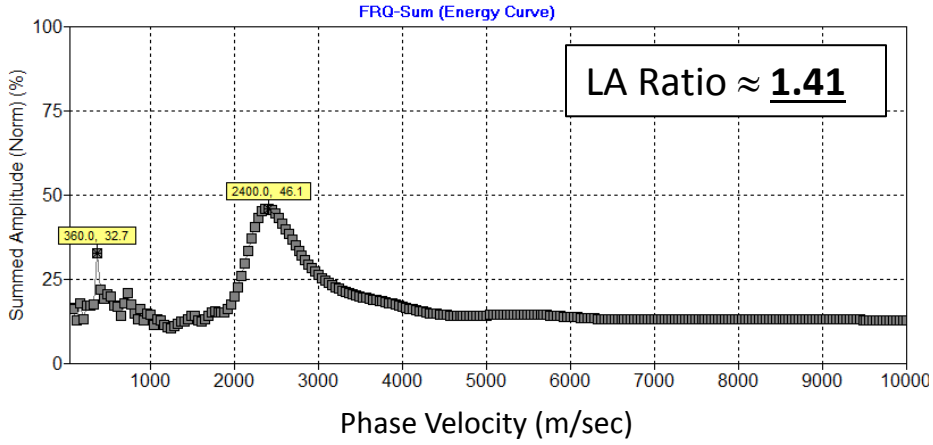




Re-sampled (9-Channel) Record (5dx = 3.760 cm)

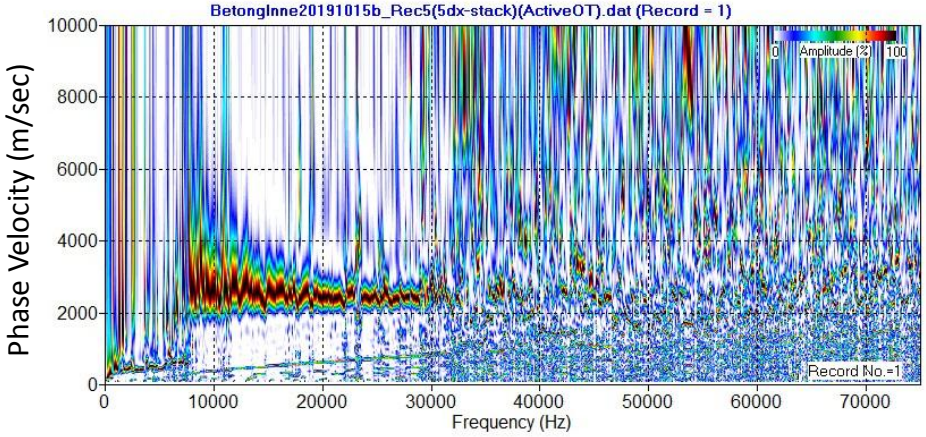
Simple Re-sample

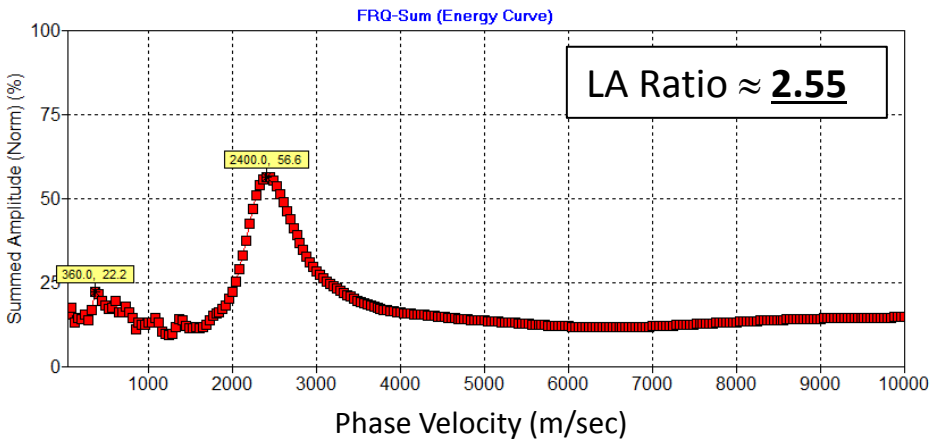




LA Ratio ≈ **1.41**

Stack-Re-sample

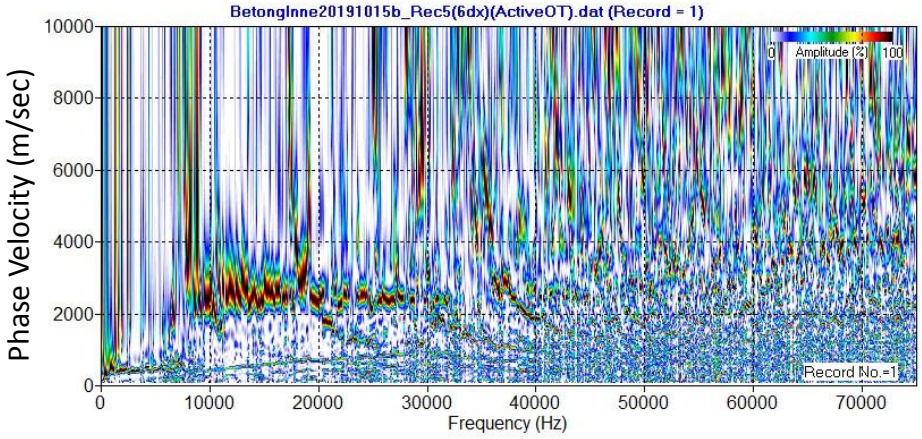


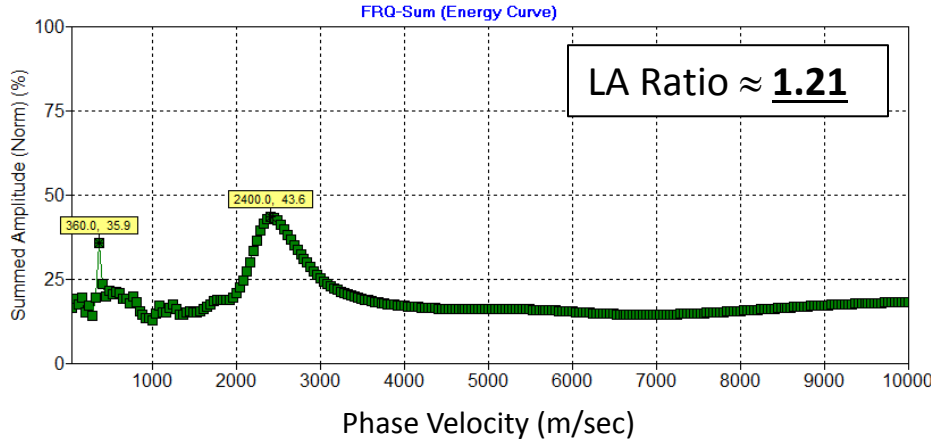


LA Ratio ≈ **2.55**

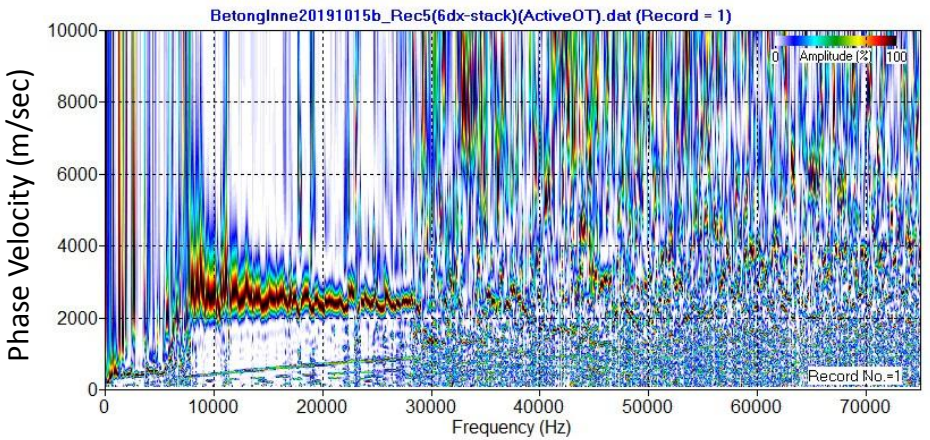
Re-sampled (8-Channel) Record (6dx = 4.512 cm)

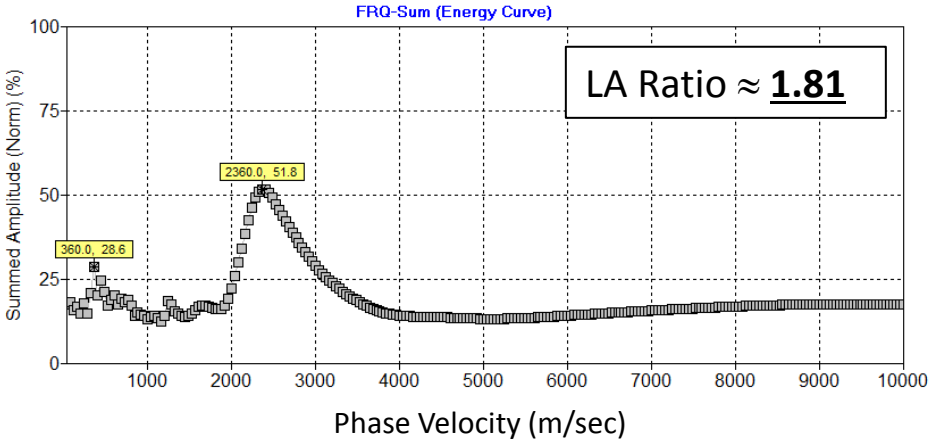
Simple Re-sample





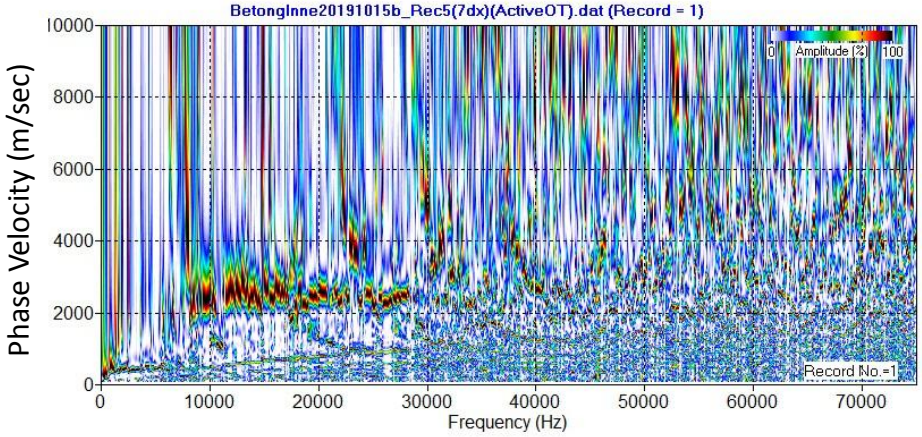
Stack-Re-sample

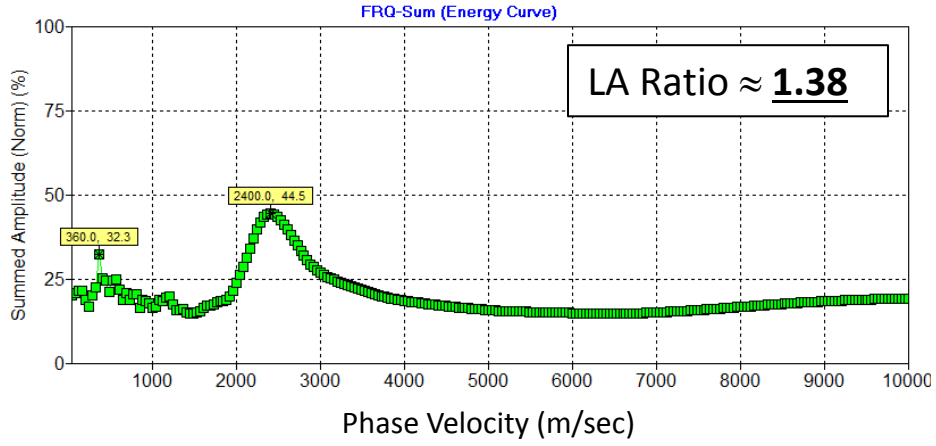




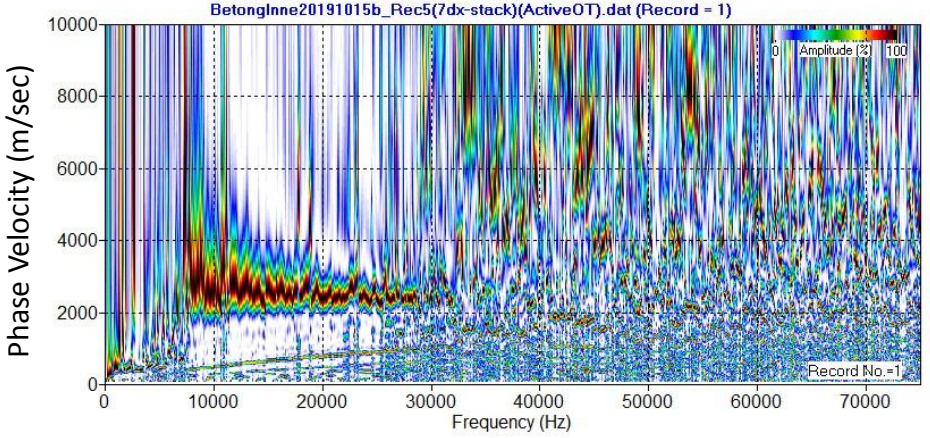
Re-sampled (7-Channel) Record (7dx = 5.264 cm)

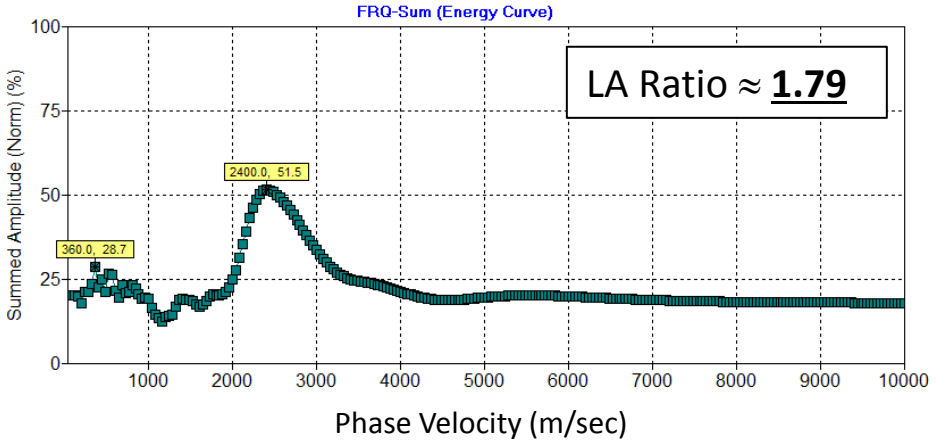
Simple Re-sample





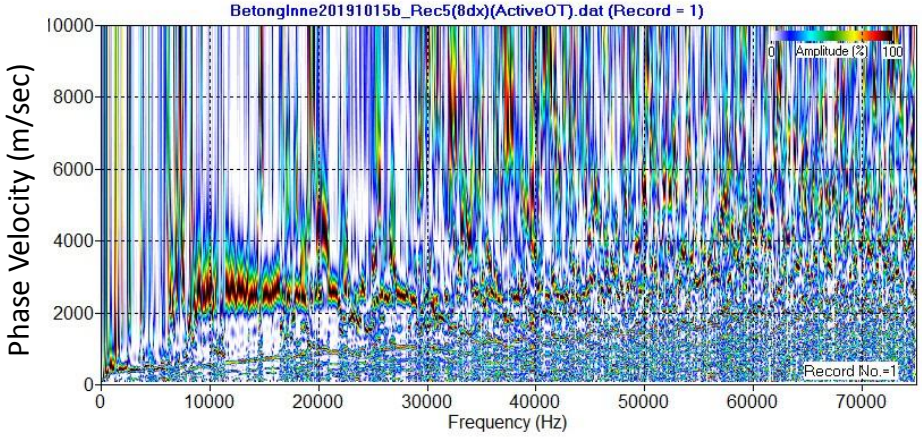
Stack-Re-sample

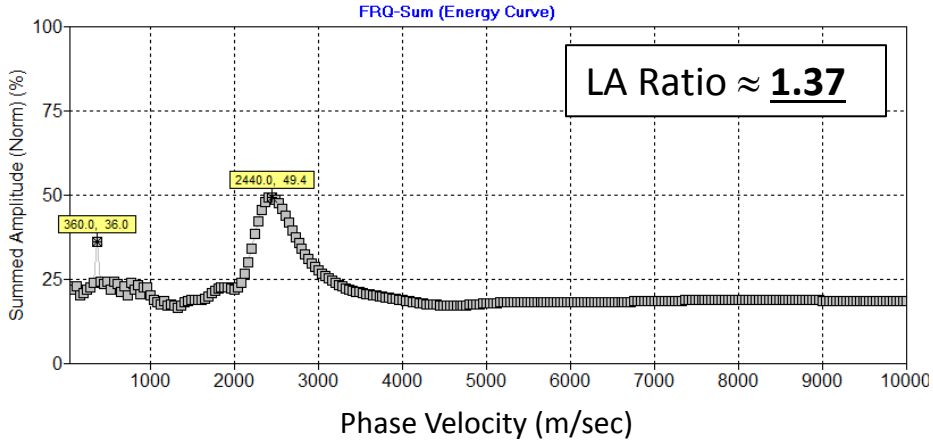




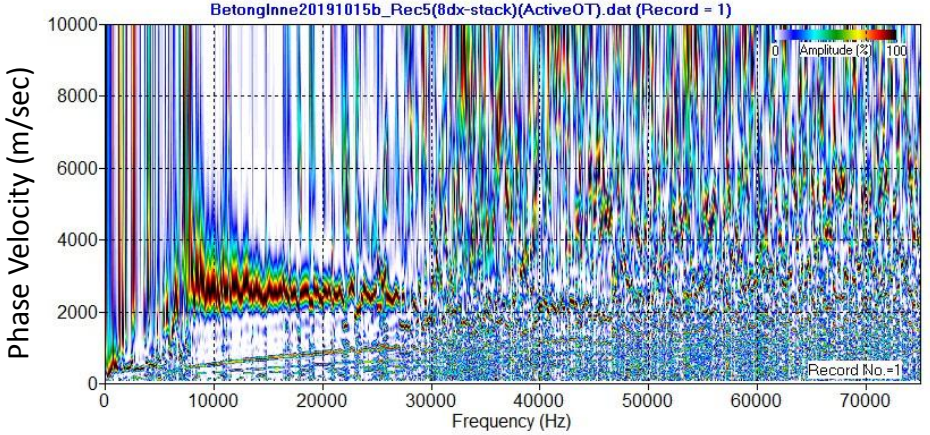
Re-sampled (6-Channel) Record (8dx = 6.016 cm)

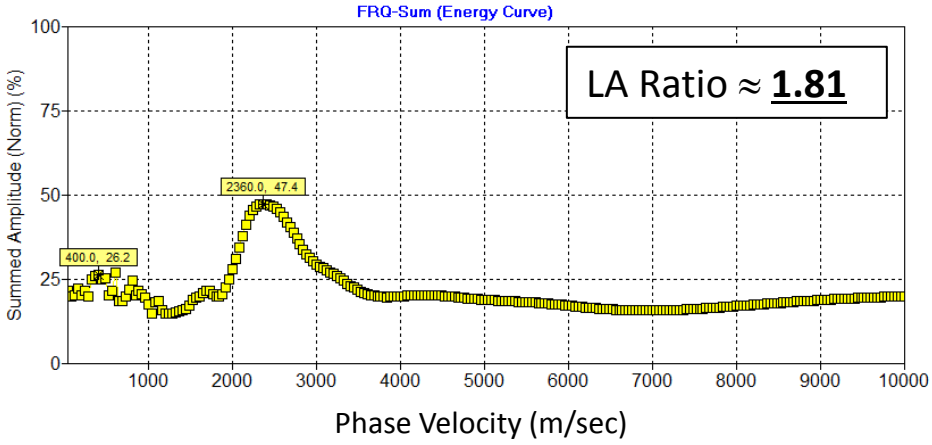
Simple Re-sample





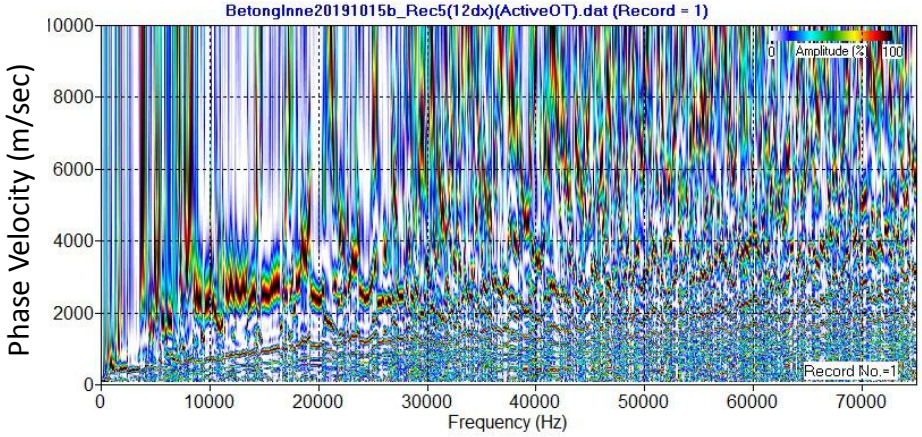
Stack-Re-sample

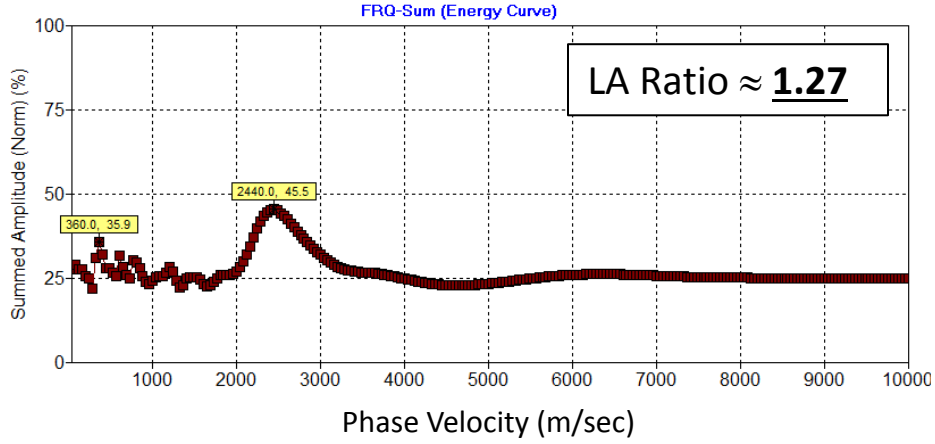




Re-sampled (4-Channel) Record (12dx = 9.024 cm)

Simple Re-sample





Stack-Re-sample