

Seismic Acquisition Projects 2009

**Malcolm B. Bertram, Kevin W. Hall, Gary F.
Margrave, Don C. Lawton, Joe Wong and
Eric V. Gallant**



Projects

March 2009 9C VSP and 3C 2D line



August 2009 low frequency tests



2009 Geophysics Field School



New small thumper seismic source



N



VSP tests



Low frequency test spread



RAO



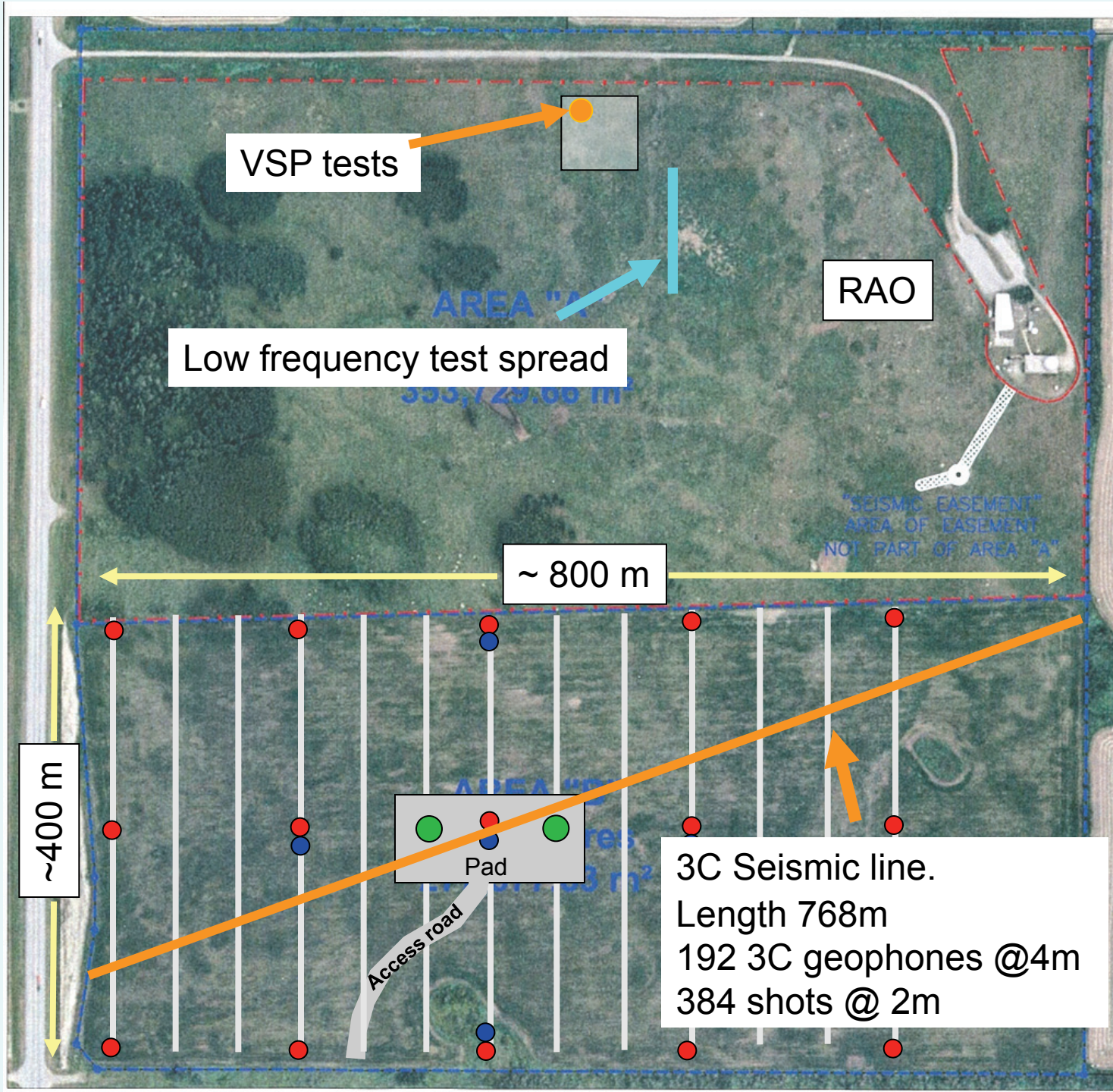
~ 800 m

~400 m

Pad

Access road

3C Seismic line.
Length 768m
192 3C geophones @4m
384 shots @ 2m



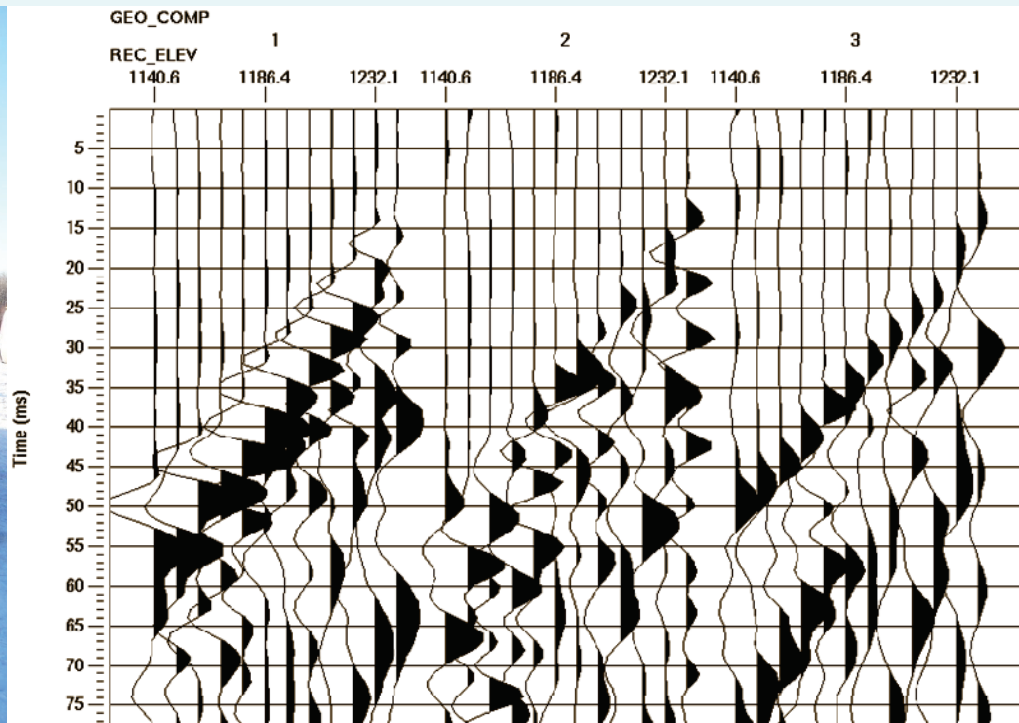
9C VSP

3C Geostuff downhole clamping geophone

Geometrics Geode recording system

Source: U of C EnviroVibe (vertical), U of A MiniVibe (horizontal (SV and SH))

Sweeps (Hz): 10(14)-250, 10(14)-25, 15-35, 25-50, 40-70, 60-105, 95-155, 145-250



U of C EnviroVibe

U of A MiniVibe

Vertical source into 3C downhole geophone

3C 2D line

192 3C Sensor SM24 10Hz geophones spaced at 4m

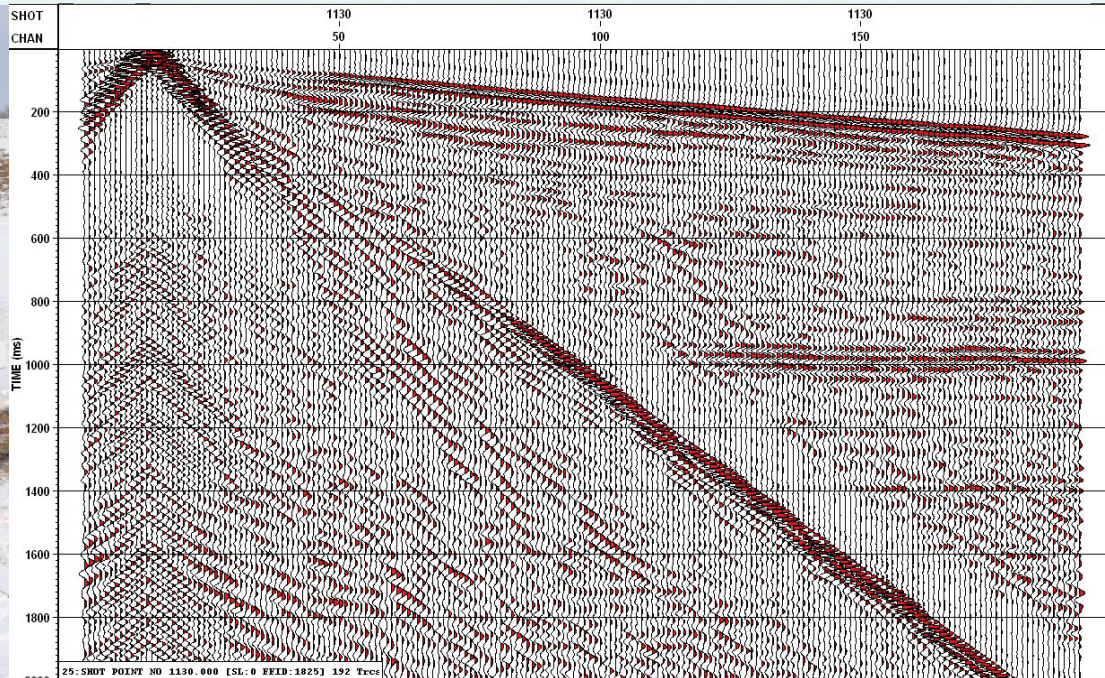
Recording system: U of C Aries SPMLite

Source: U of C EnviroVibe at 2m source interval

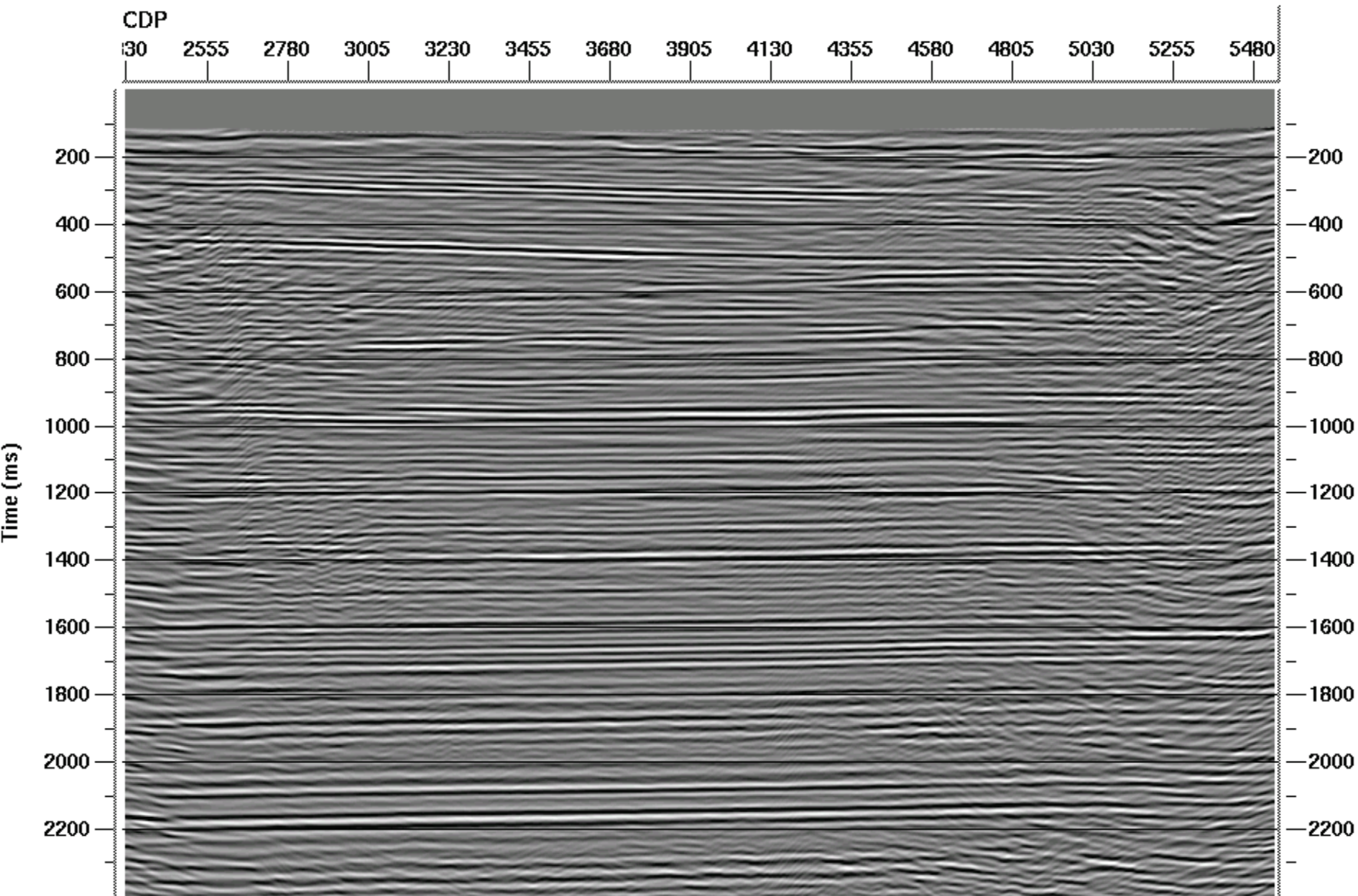
Sweep: 10-150 Hz over 20 seconds (4 sweeps per VP)



U of C EnviroVibe

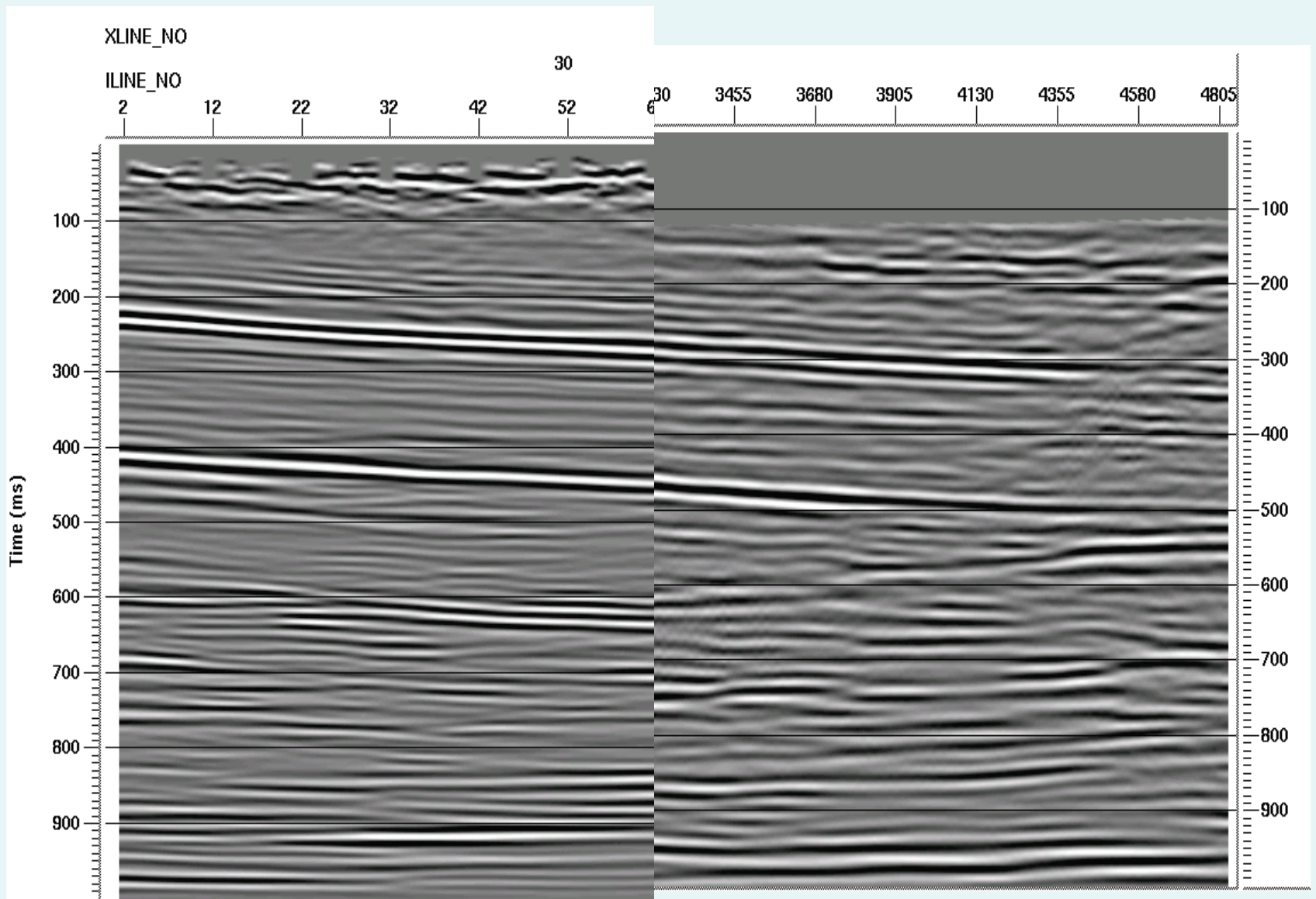


Typical shot gather



← W

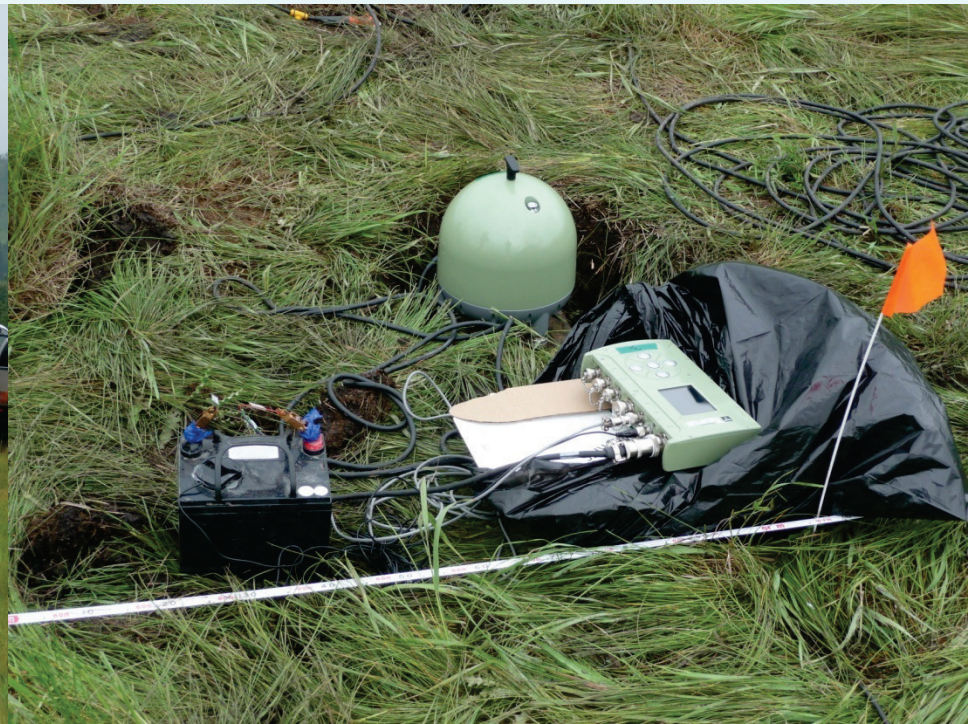
Migrated section from 2009 Priddis 2D (vertical)



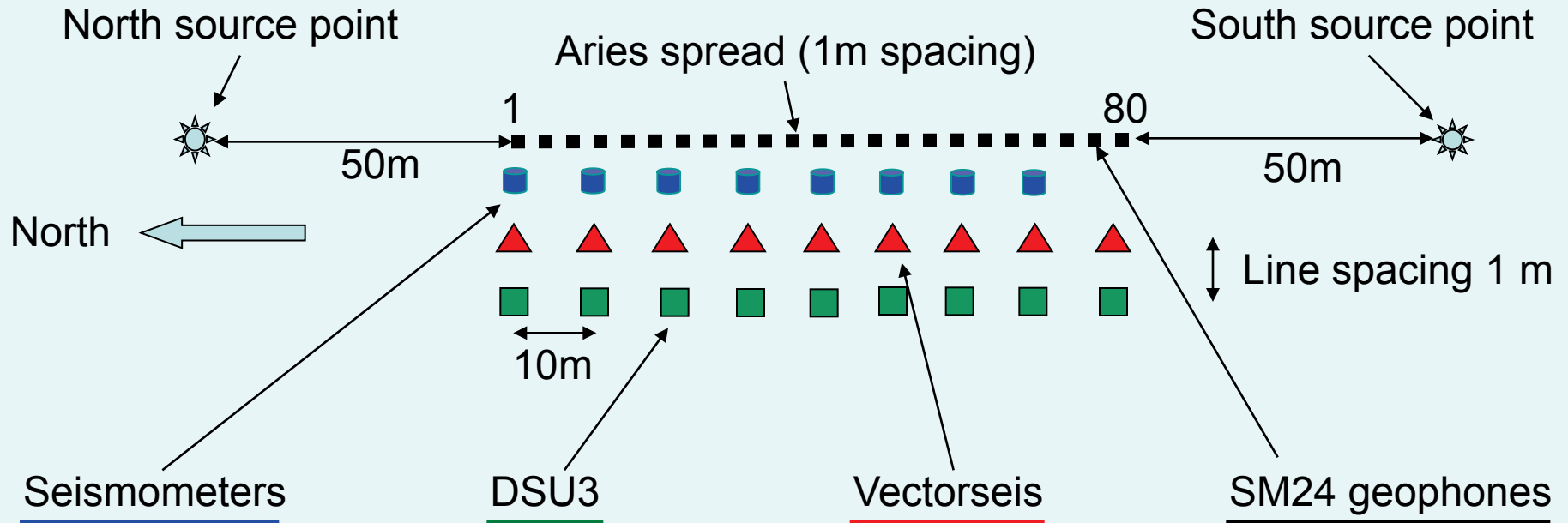
The section for 2007 3D is on the left; for 2009 2D is on the right.

August 2009 low frequency tests

Sensors:	Recording systems:	Low cut filters (Hz):
Nanometrics Trillium 240	Taurus (autonomous)	0.004
ION Vectorsis MEMs	ION Scorpion	1.46
Sercel DSU3 MEMs	Sercel 428XL	0
Sensor SM24 10Hz geophones	Aries SPMLite	1



Layout for low frequency test



Source parameters

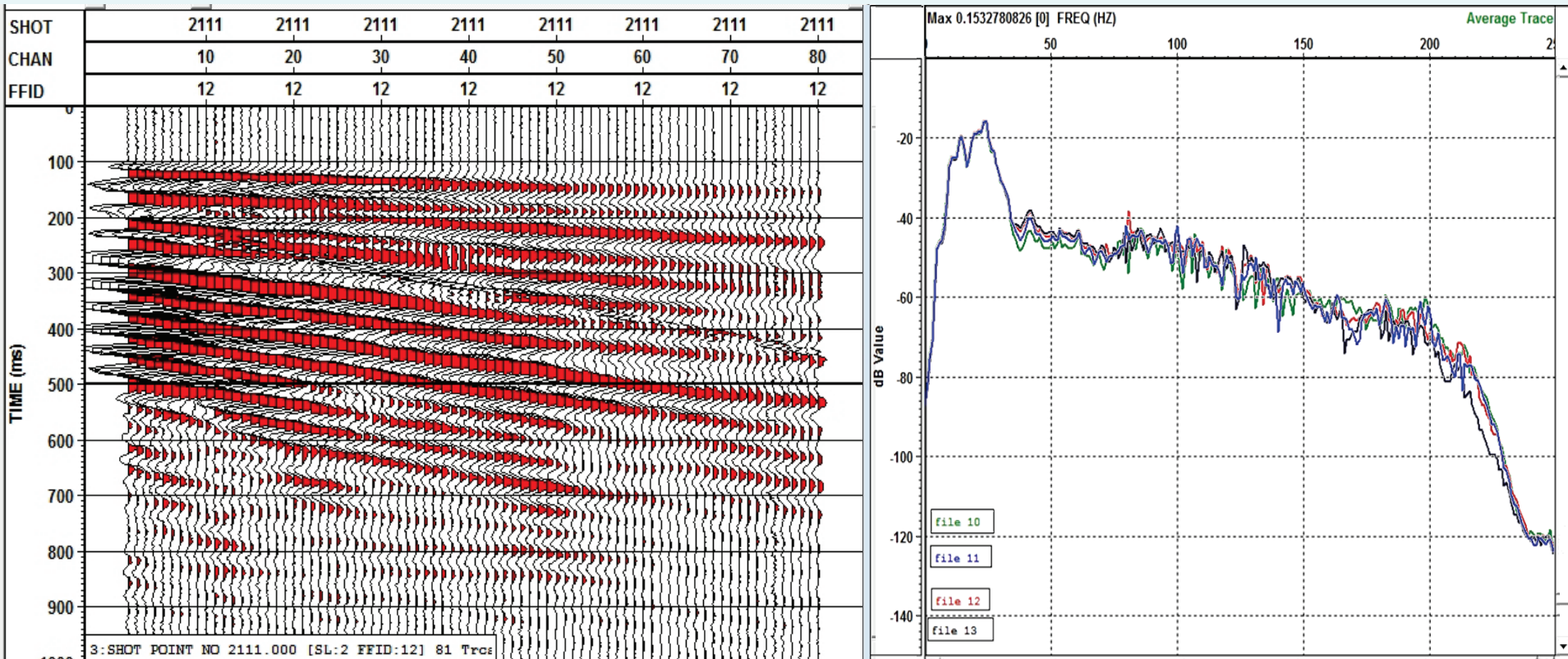
Large thumper

Operated with and without elastic bands installed



Sweep Number	Frequency Start-Stop	Length Seconds	Power %	Start Taper	Stop Taper
9	3 – 3	30	3	0.1	0.1
10	5 – 5	30	5	0.1	0.1
11	2 – 10	50	10	25	0.1
12	2 - 10	30	10	15	0.1
13	2 - 10	10	10	5	0.1
14	2 - 100	30	25	5	0.1
14	2 - 100	30	50	5	0.1
14	2 - 100	30	75	5	0.1

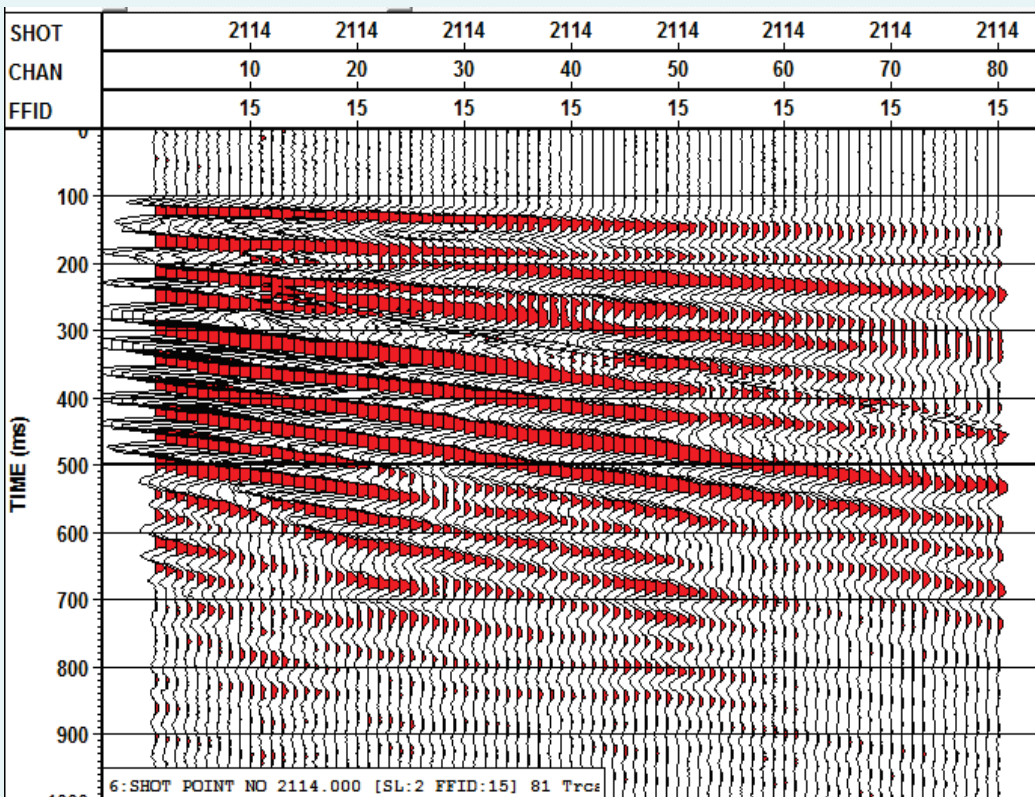
Thumper source data without bands



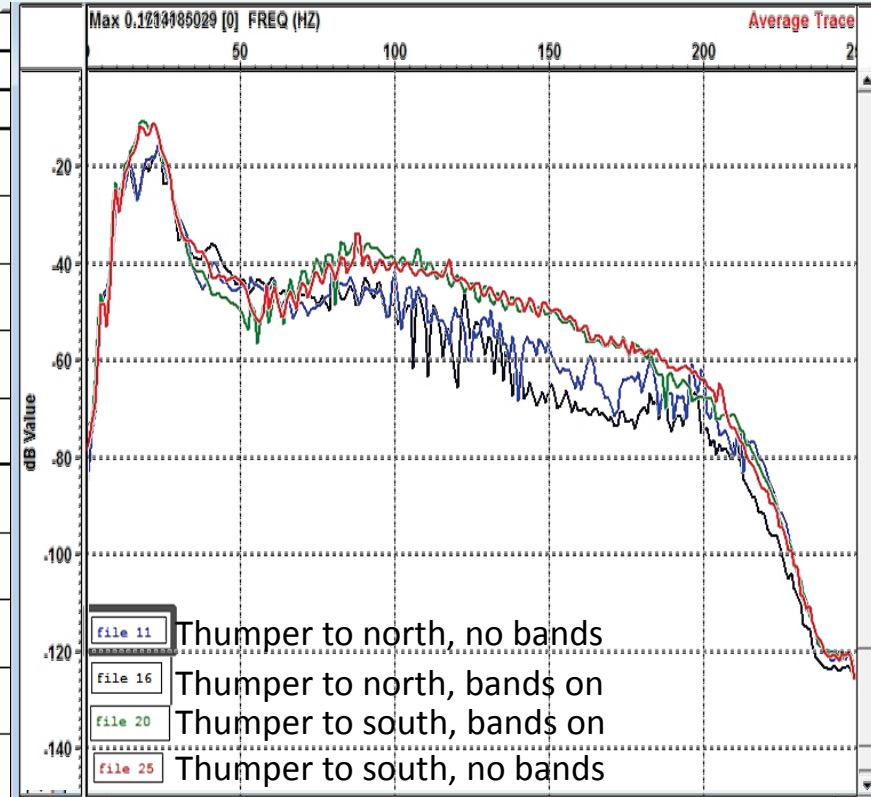
Vertical component geophone
shot gather for one thump
without bands installed

Spectra for four thumps at the same
location (north source point) without
elastic bands installed

Thumper source data with bands installed and tensioned

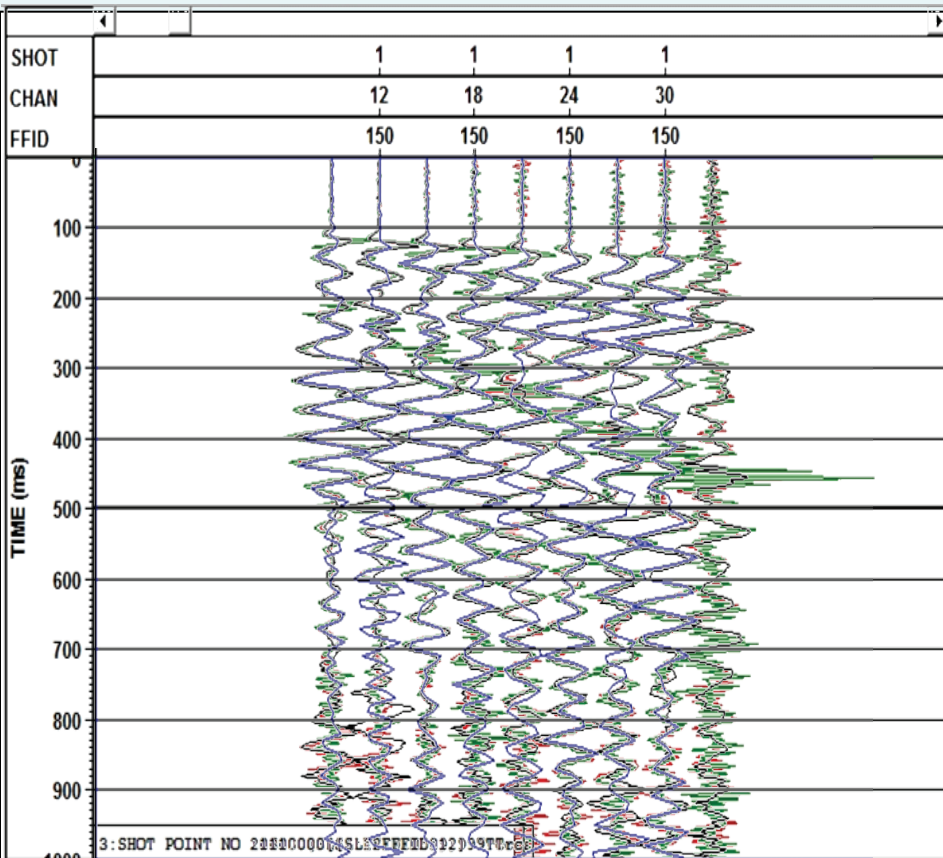


Vertical component geophone shot gather for one thump with bands installed and tensioned

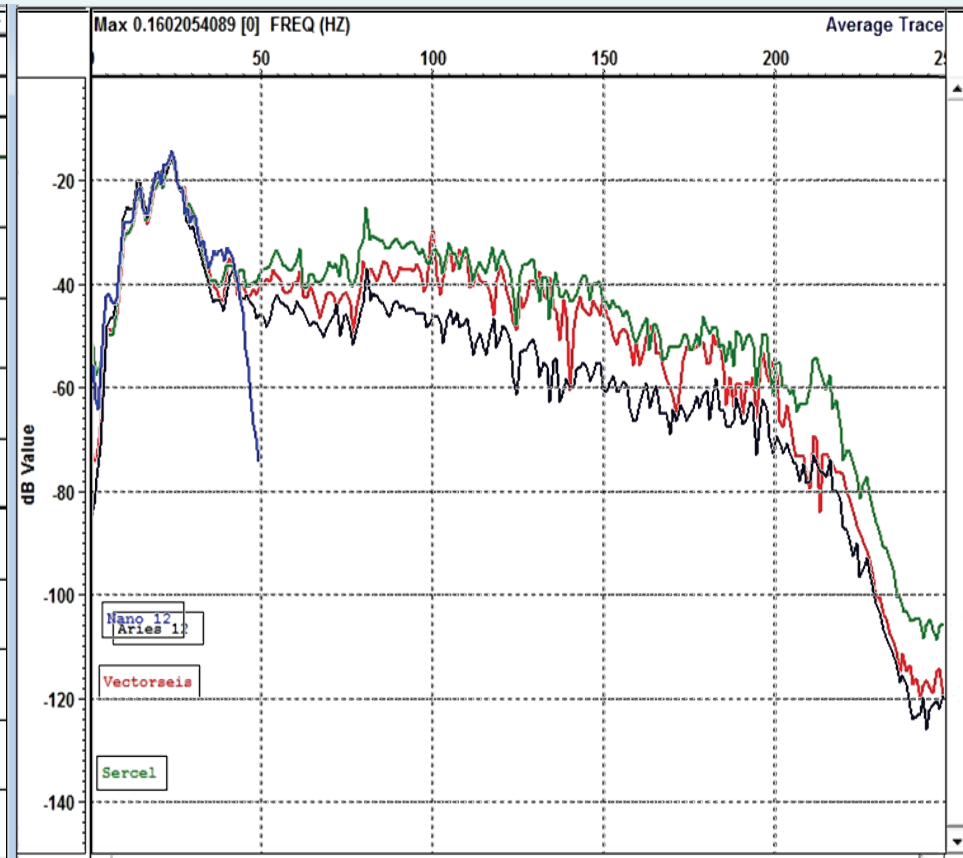


Comparison of thumper at both ends of spread, with and without bands.

Comparison of four sensors for thumper source at north source point

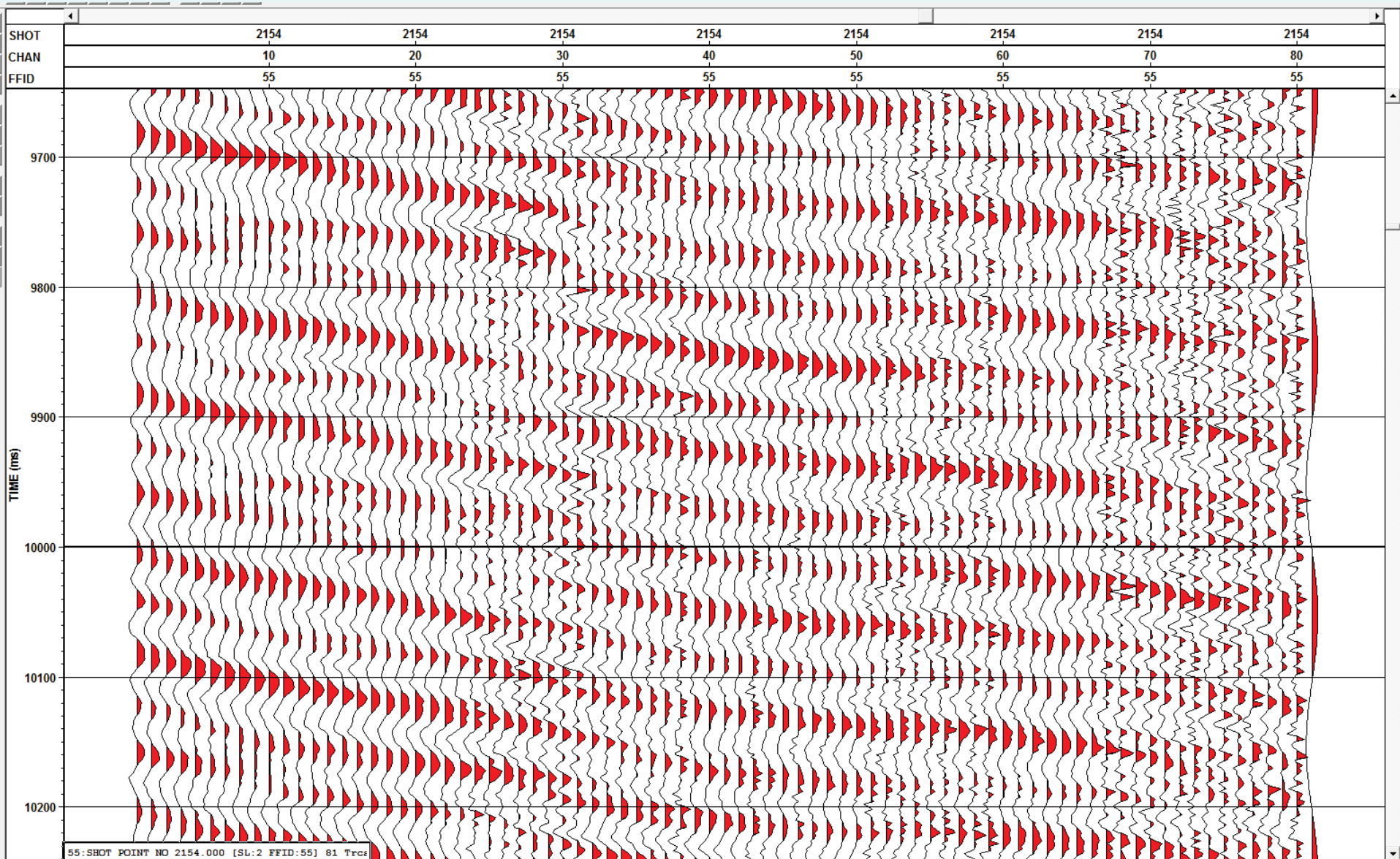


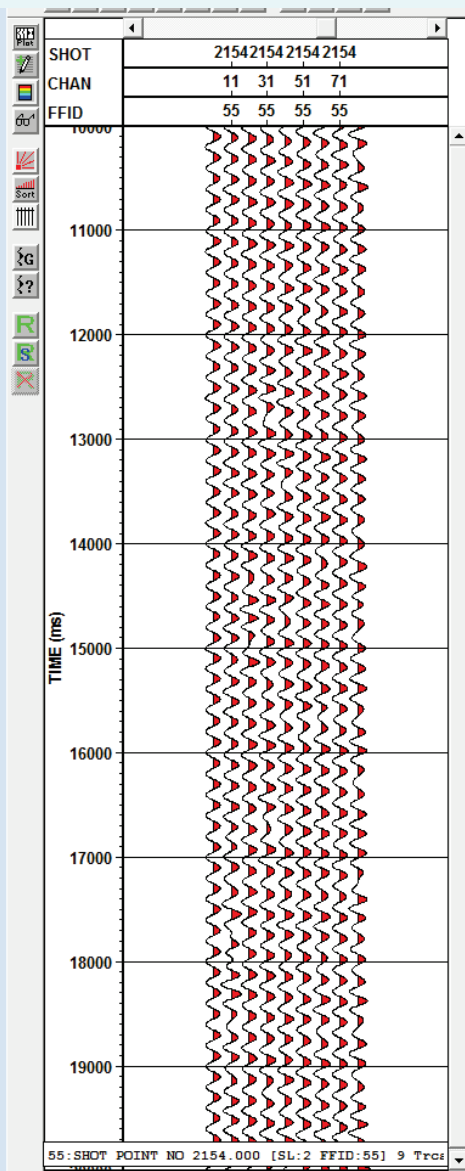
Overlay of the four sensors



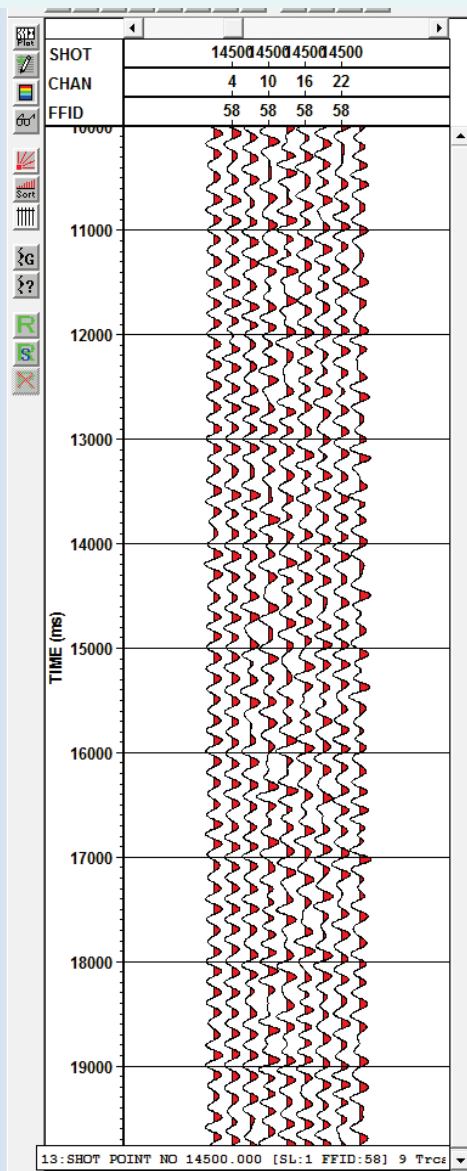
Comparison of spectra

Black=SM24, Green=DSU3, Red=Vectorseis, Blue=Trillium 240

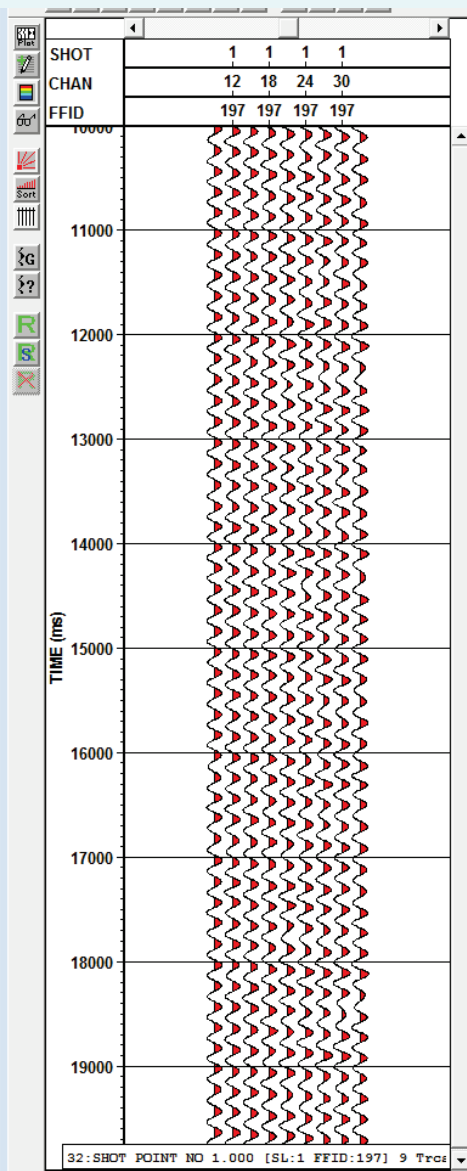




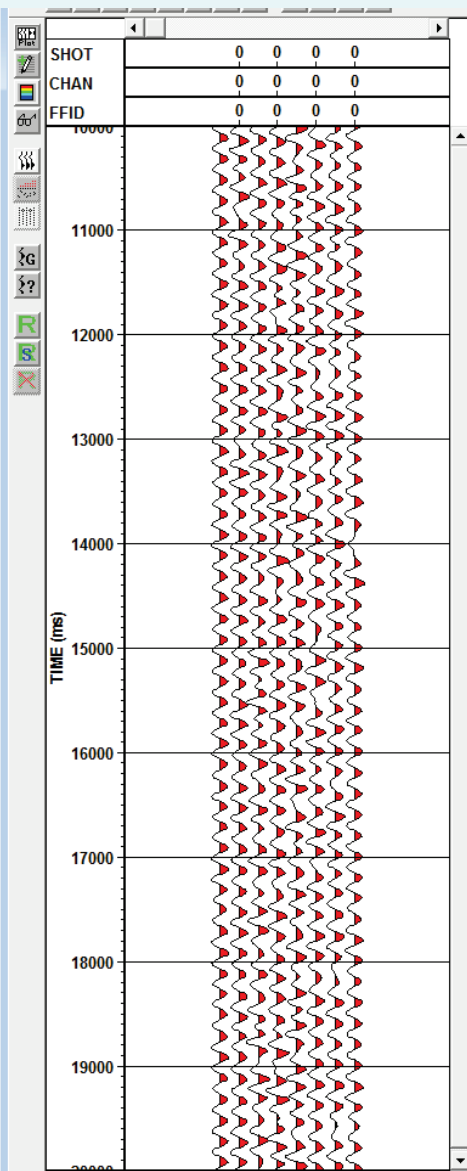
SM24



DSU3

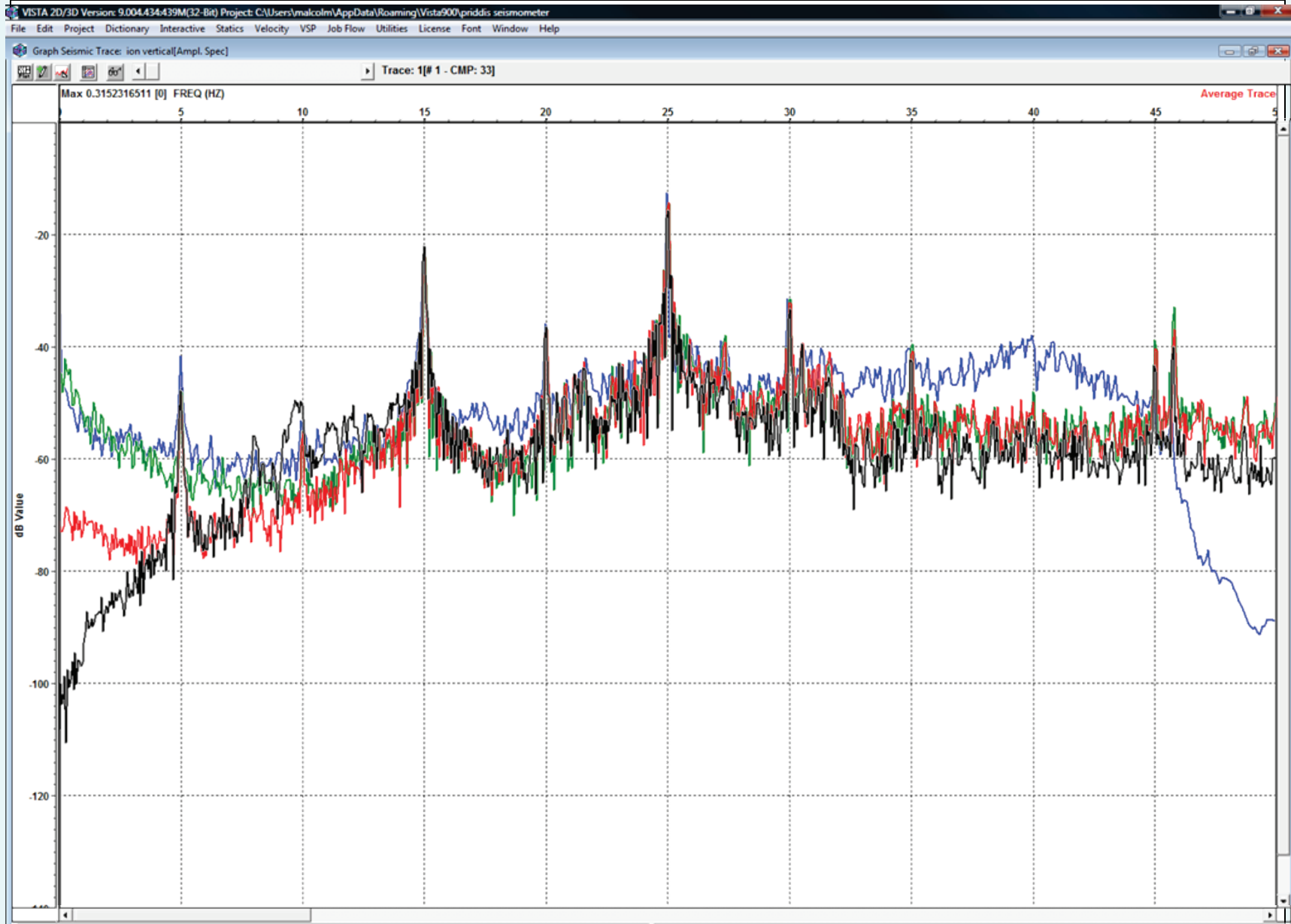


Vectorseis



Trillium 240

5Hz mono-frequency sweep. 3-4-6-8 filter. AGC applied



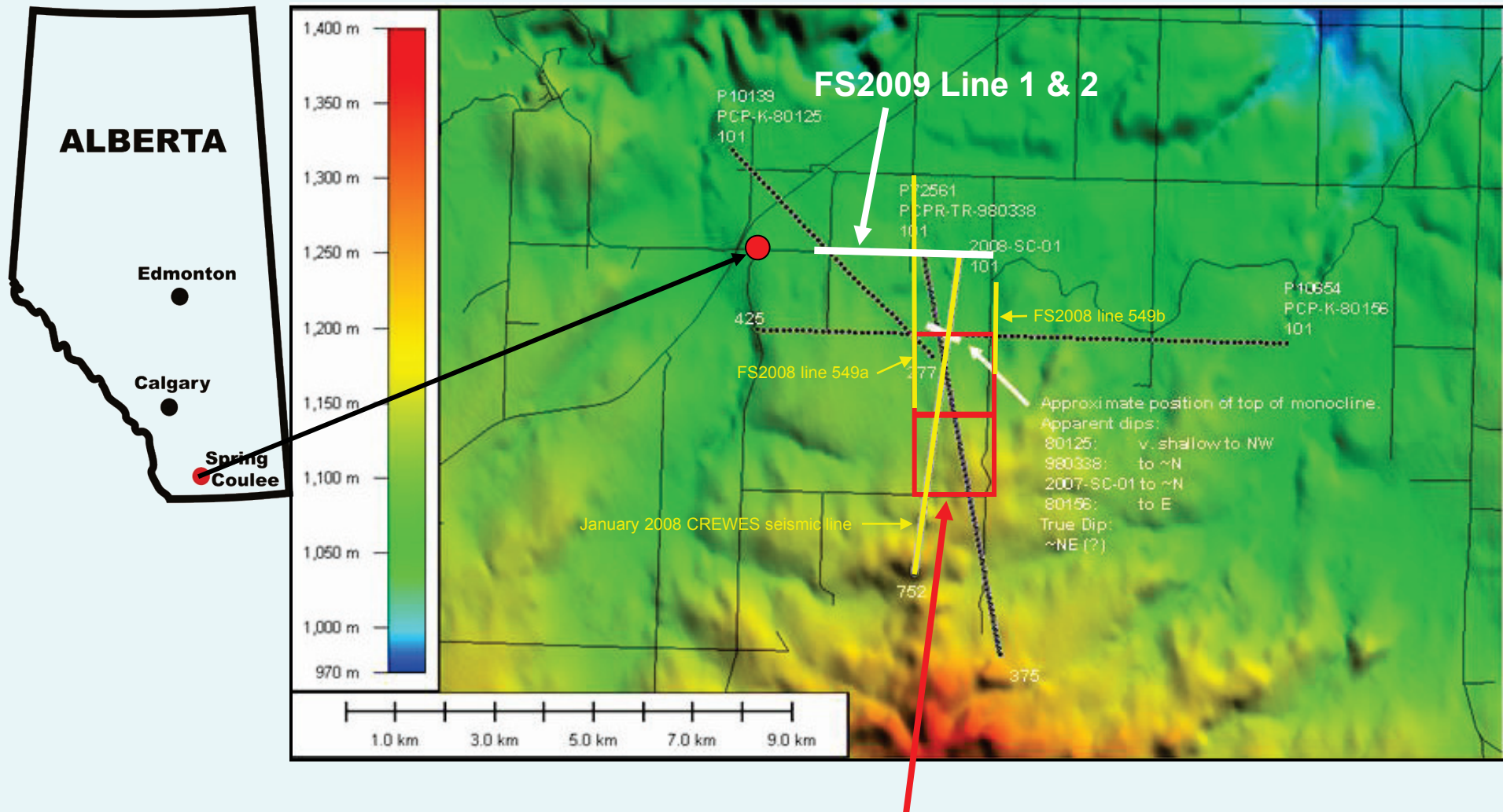
Spectra for 5 Hz mono-frequency sweep

Black=SM24, Green=DSU3, Red=Vectorseis, Blue=Trillium 240

Field School 2009

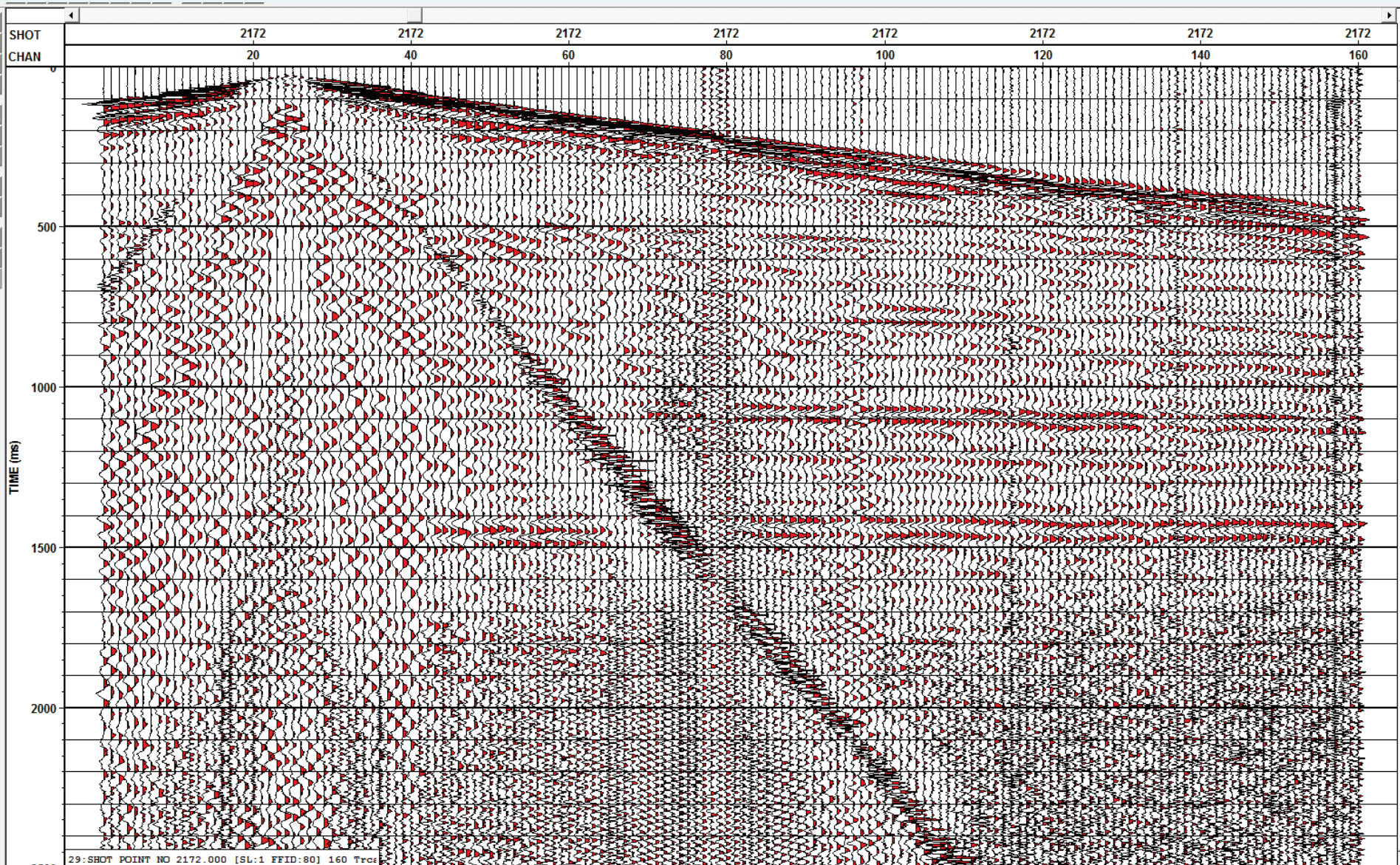


Line location



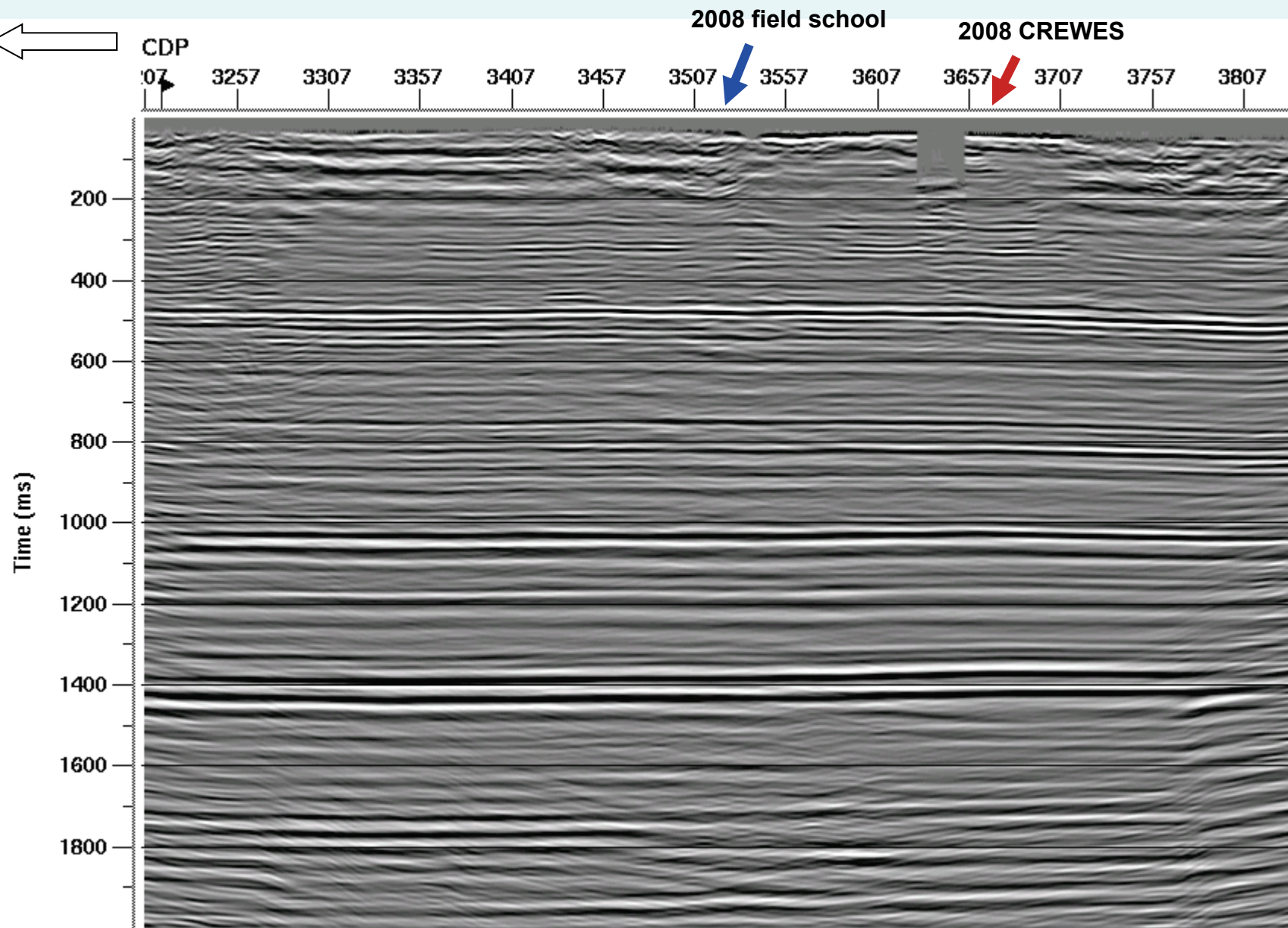
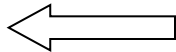
Section 14 and 23, T4 R23 W4M

Shot gather from Line 1



Sample rate=1 msec; record length=4 sec; sweep 10-250 Hz over 20 sec, 4 / vp

W



The migrated section for the vertical component 2009 line1.

New thumper seismic source

400 lb hammer

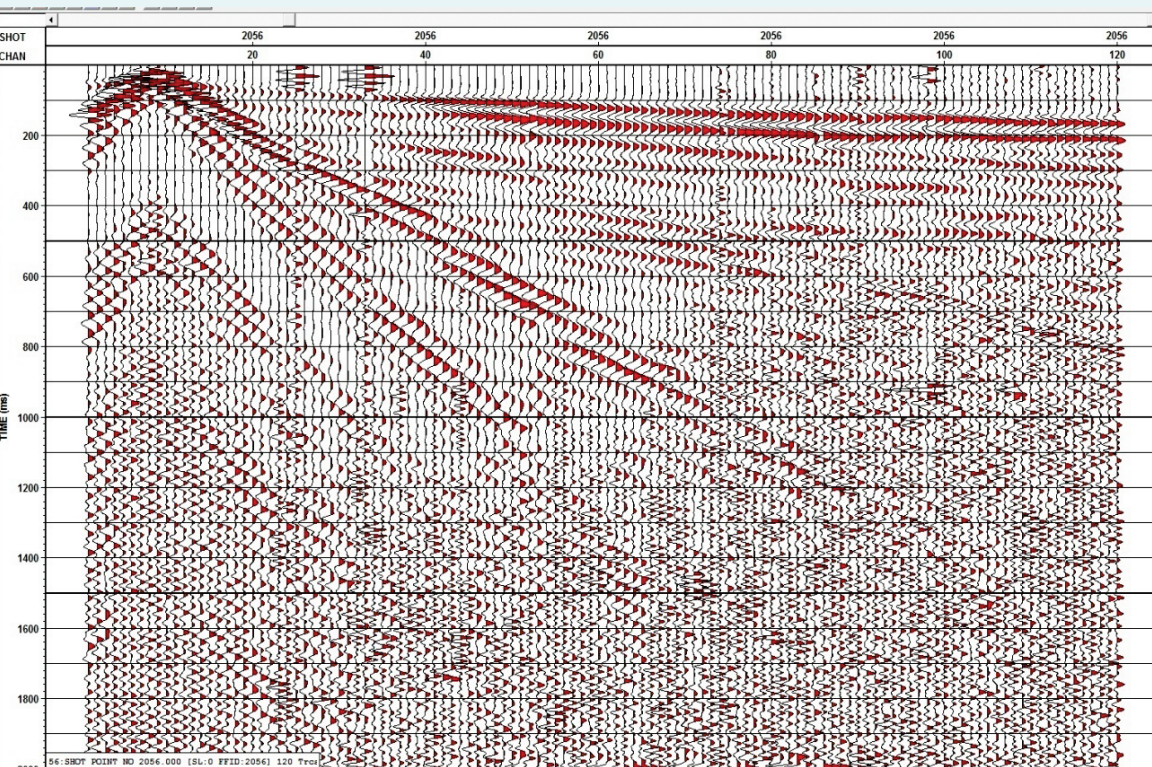
Elastic band tensioning

Repeatable signature

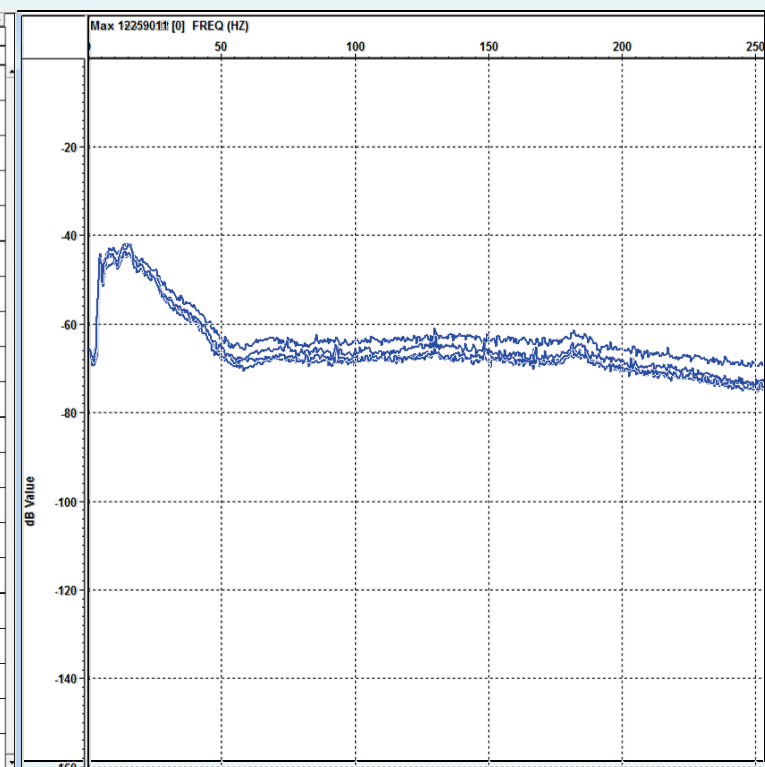


The prototype

Example of data from thumper



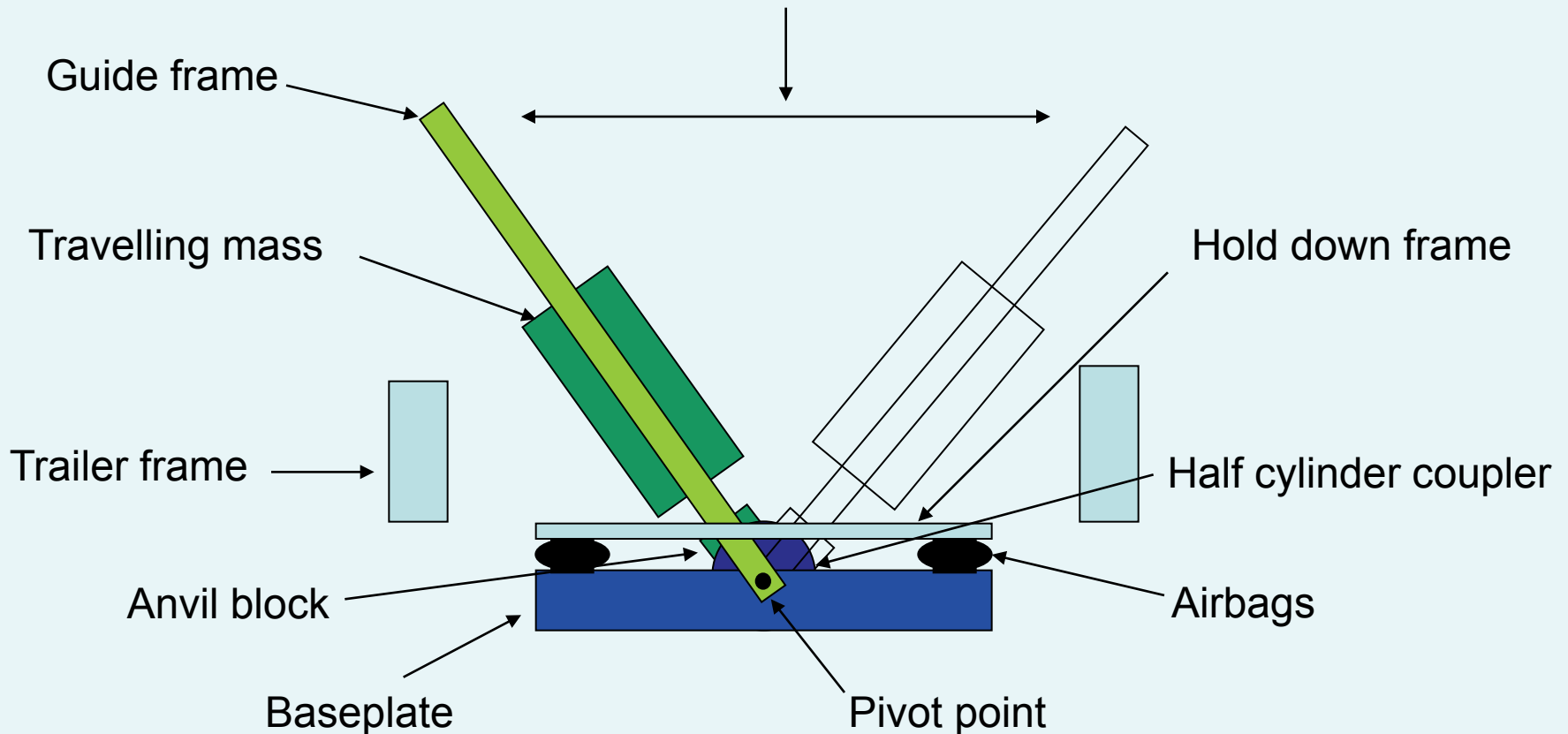
A shot gather from 2009 Field School
(stack of four thumps)



Spectra from 4 consecutive
shotpoints

Shear wave thumper

Mechanism can swing to at least 45 degrees either way, or operate vertically



Acknowledgements

CREWES faculty, staff and students who assisted with the field work

The University of Alberta for use of the MiniVibe, and providing Len Tober and Lucas Duerksen to operate it for the 9C VSP

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ION for providing the Vectorseis sensors and Scorpion recording system

CGGVeritas for providing the Sercel DSU3 sensors and 428XL recording system

Dave Eaton for allowing the use of the Nanometrics Trillium 240 seismometers

Students from the 2009 Geophysics Field School

GEDCO for Vista software

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