



This slide presentation was presented at the May 3, 2004 Coyote Creek Shear velocity Comparison Workshop at the USGS, Menlo Park, CA.

This is an extract from Asten, M.W., and Boore, D.M., eds., Blind comparisons of shear-wave velocities at closely spaced sites in San Jose, California: U.S. Geological Survey Open-File Report 2005-1169. [available on the World Wide Web at <http://pubs.usgs.gov/of/2005/1169/>].

2005

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U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Active and Passive Surface-wave Tests in Williams St. Park and Other Several Sites in California

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OYO Corporation

Outline

- Williams St. Park
- Redwood City
- Dolphin Park in Los Angeles

Data Acquisition in Williams St. Park

Multi-channel analysis of surface waves (**MASW1,MASW2**)

Source : Shaker->1 or Sledge hammer(5kg)->2

Geophones : 4.5Hz

Receiver spacing : 2m

Shot spacing : 2m

Number of receivers : 24

Number of shots : 25

Analysis : MASW

Micro-tremor Array Measurement (**MAM**)

Geophones : 4.5Hz

Array size : 40m

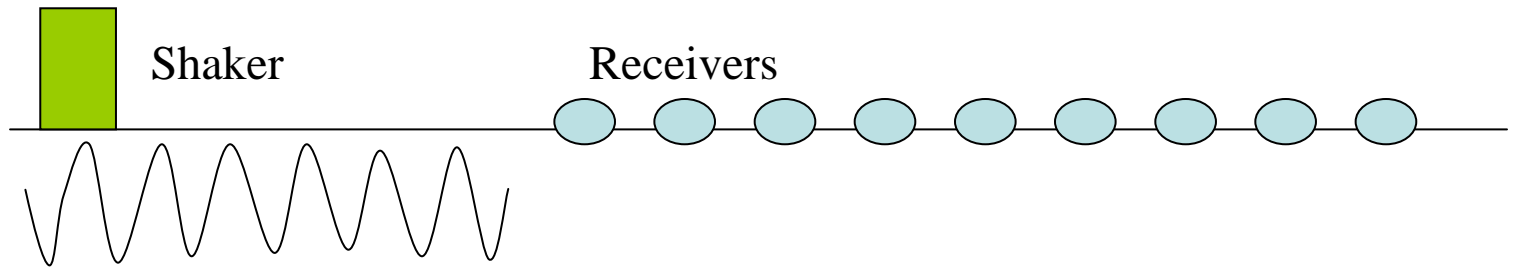
Array shape : Triangle

Number of receivers : 10

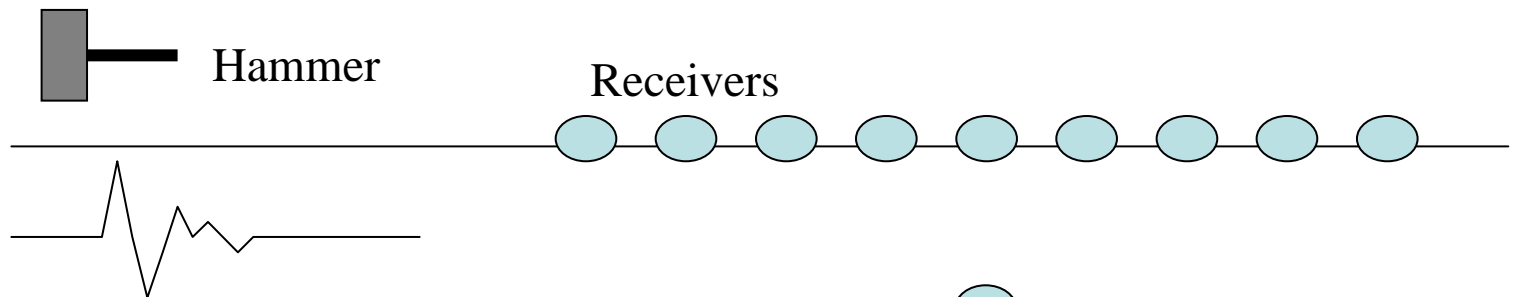
Analysis : SPAC

Data Acquisition

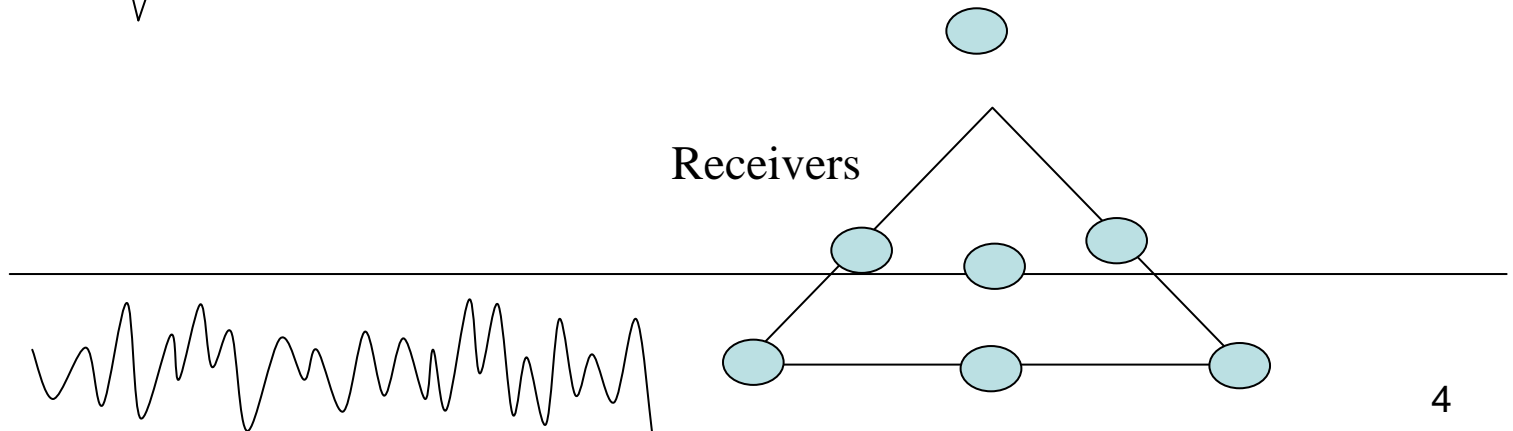
MASW1



MASW2



MAM



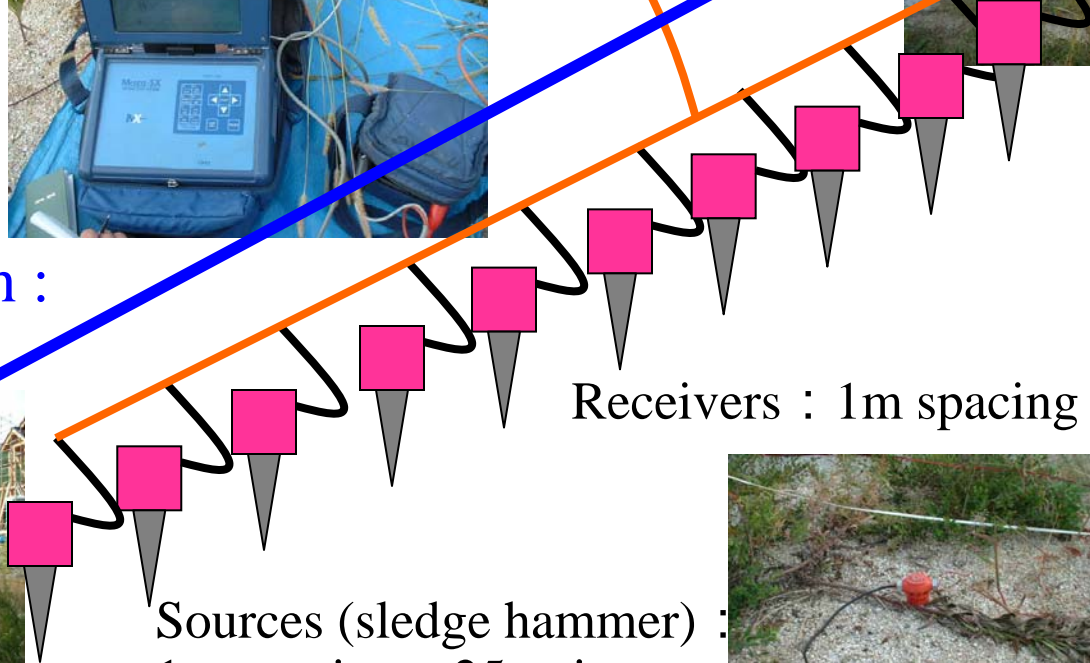
Multi-channel Analysis of Surface Waves (MASW)

Source : sledge hammer
Penetration depth : 0 to 20m

Data acquisition :
20 minutes

Analysis:
15 minutes

Survey line length :
20 ~ 30m



Receivers : 1m spacing x 24

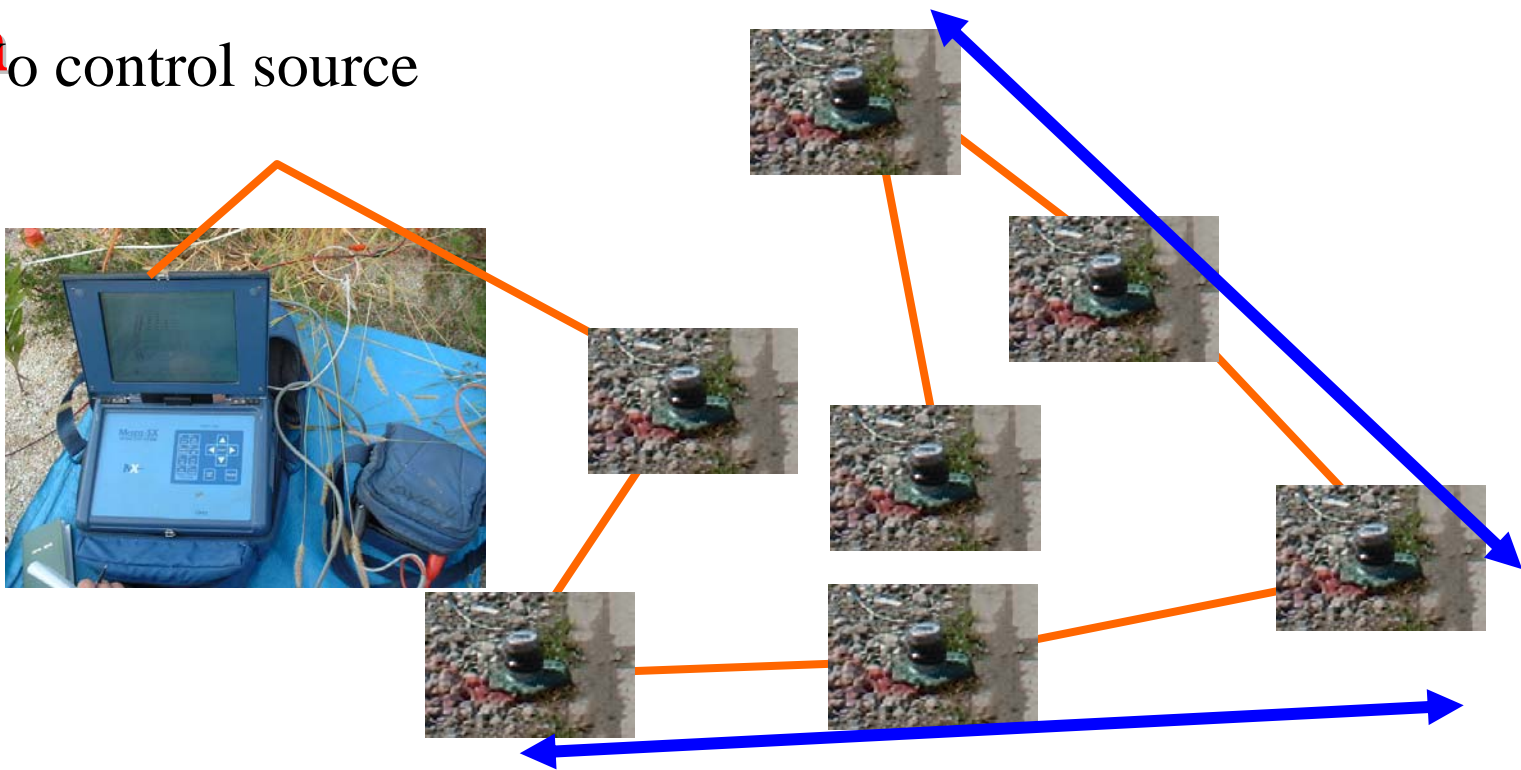
Sources (sledge hammer) :
1m spacing x 25 points



Micro-tremors Array Measurements (MAM)

**Target : 20 ~ 100m
depth**

No control source

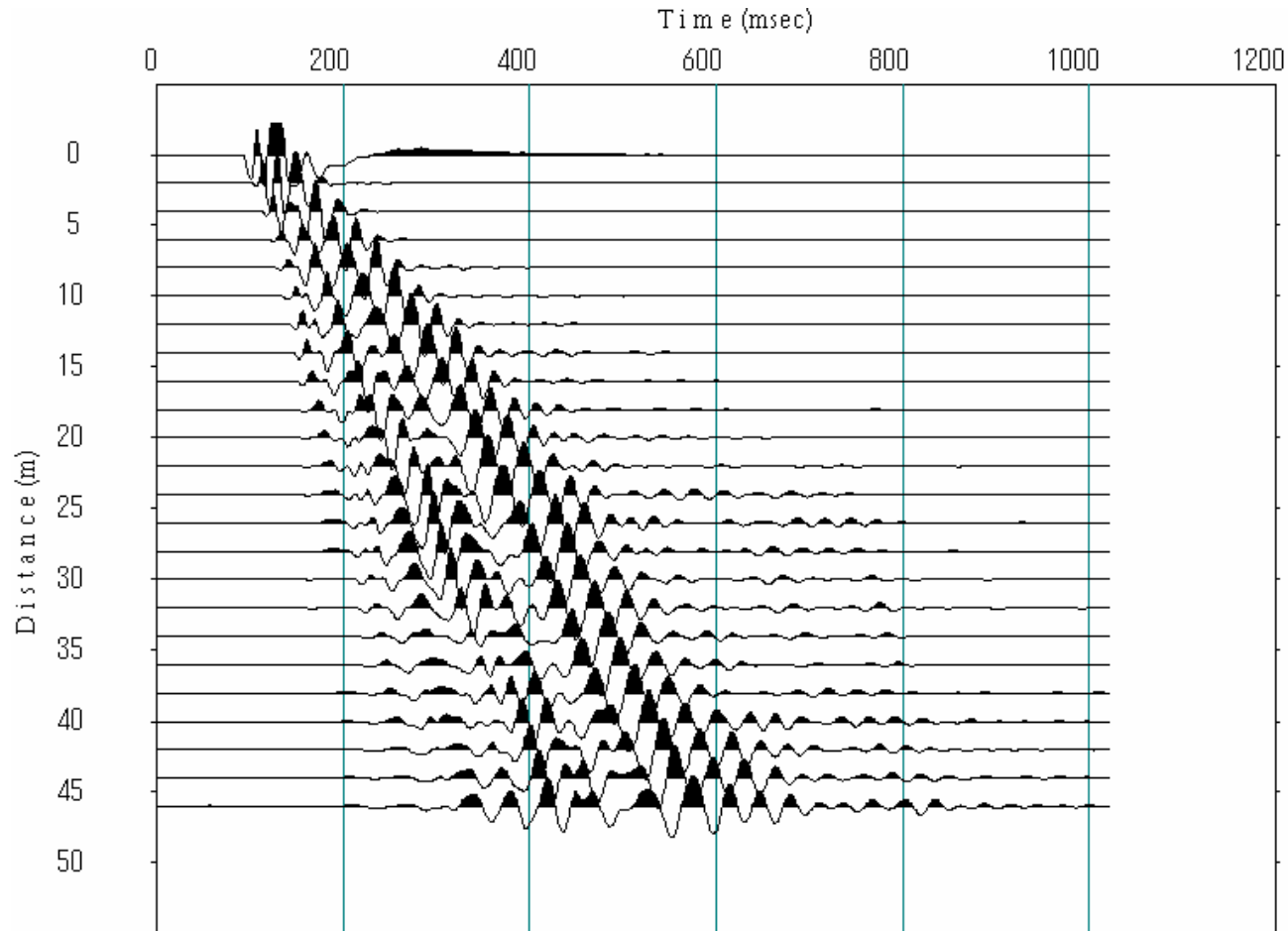


Receiver : 2Hz geophone

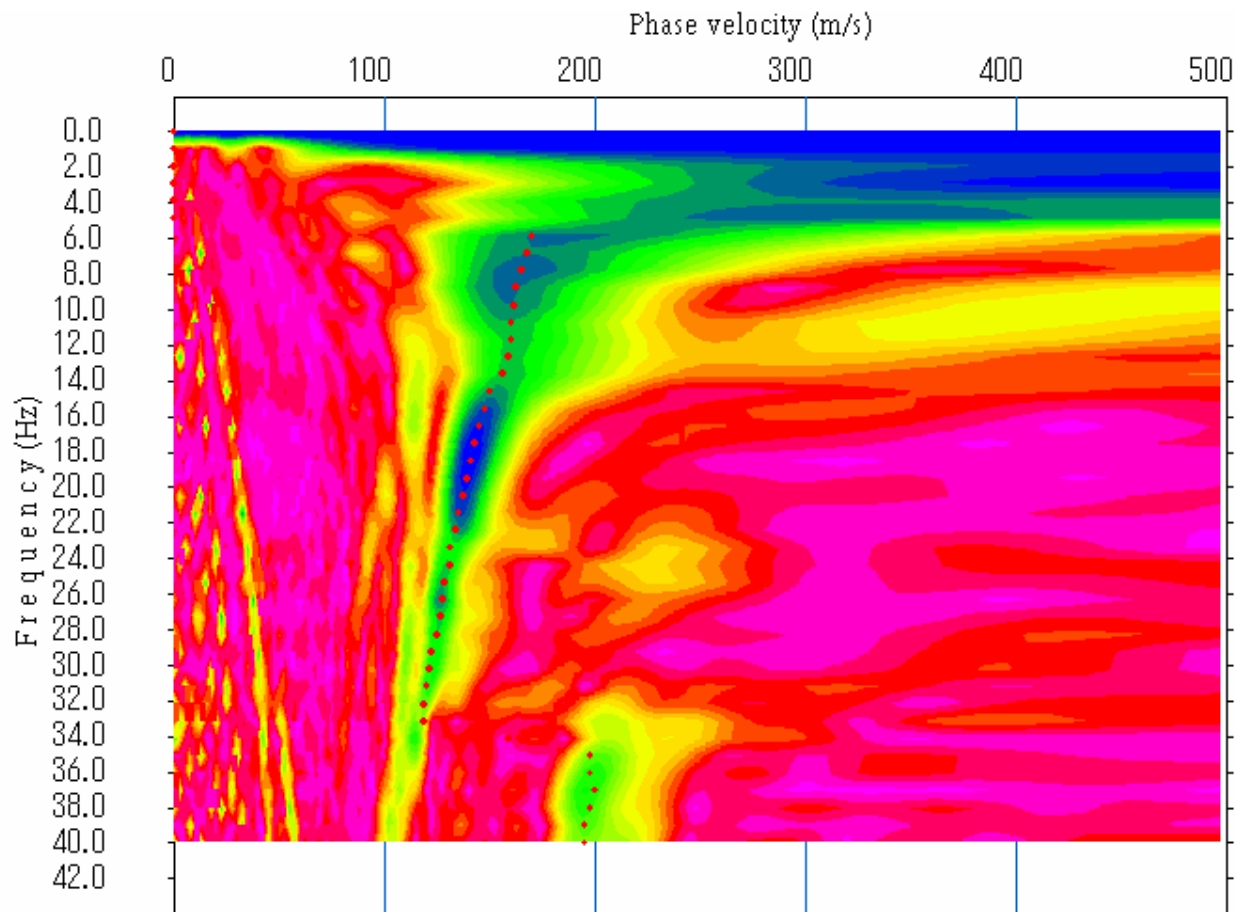
Long period seismometer

Array size : 30 ~ 60m

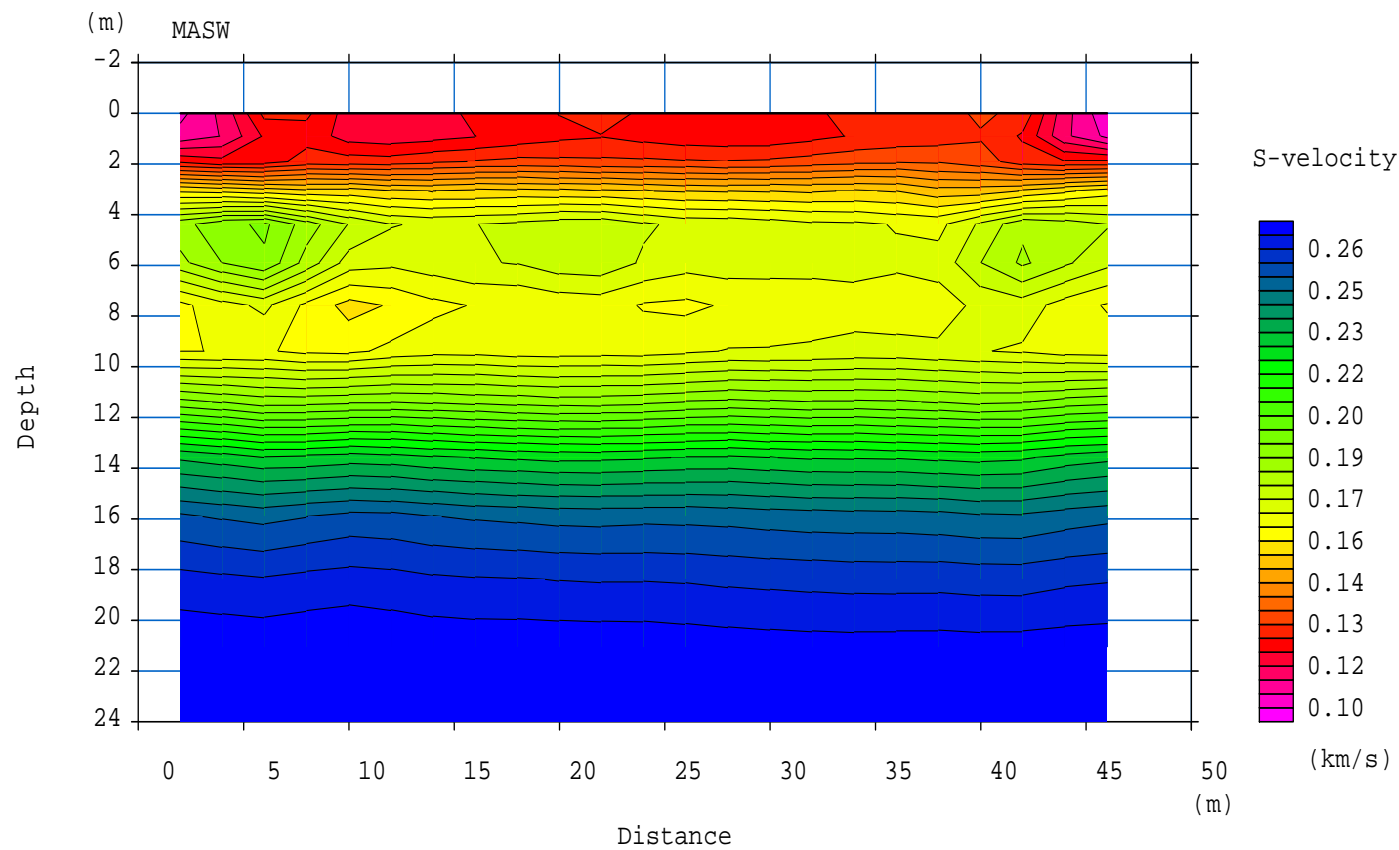
Sledge Hammer+MASW (MASW2) Time-domain Waveform



Sledge Hammer+MASW (MASW2) Phase-velocity Image

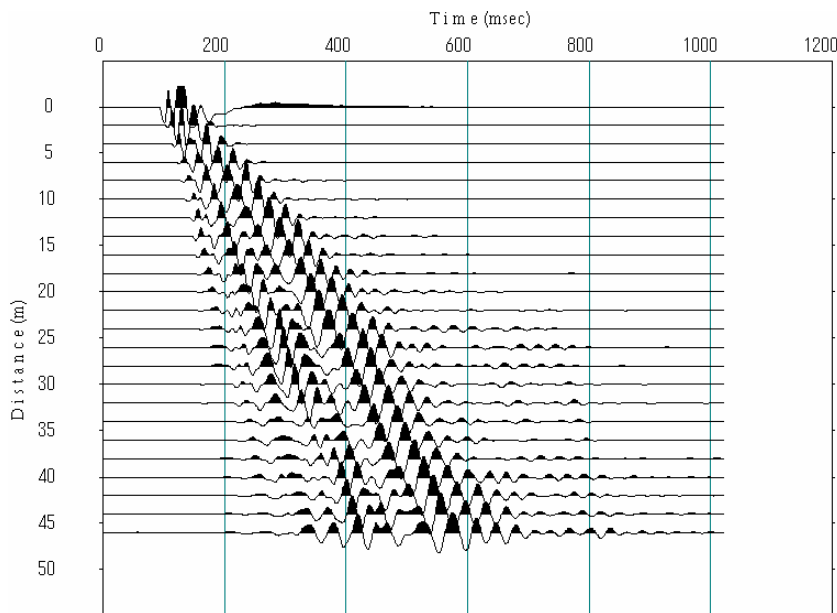


Sledge Hammer+MASW (MASW2) Analysis Result

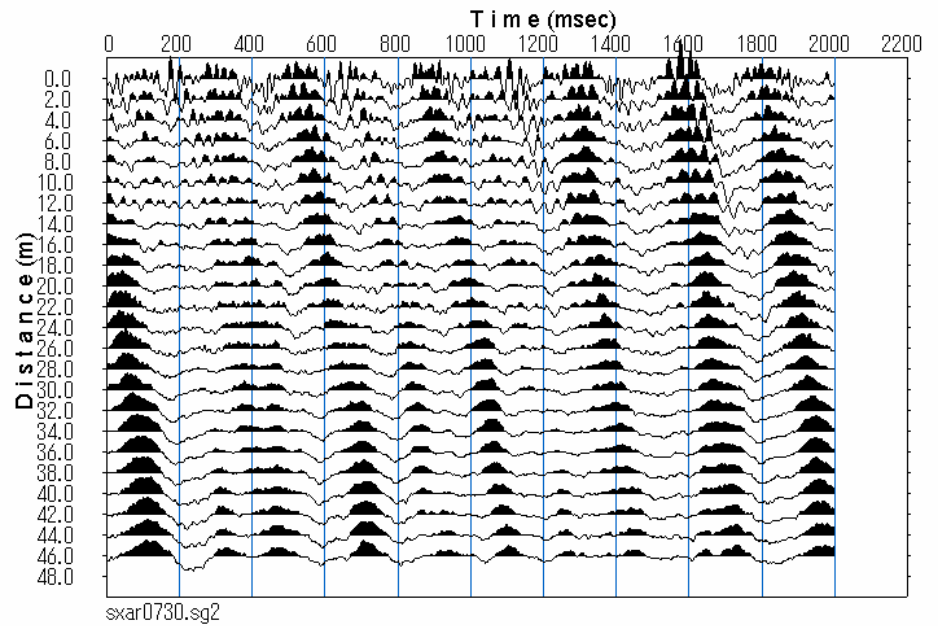


Shaker+MASW (MASW1) Time-domain Waveform

Sledge
hammer(MASW2)

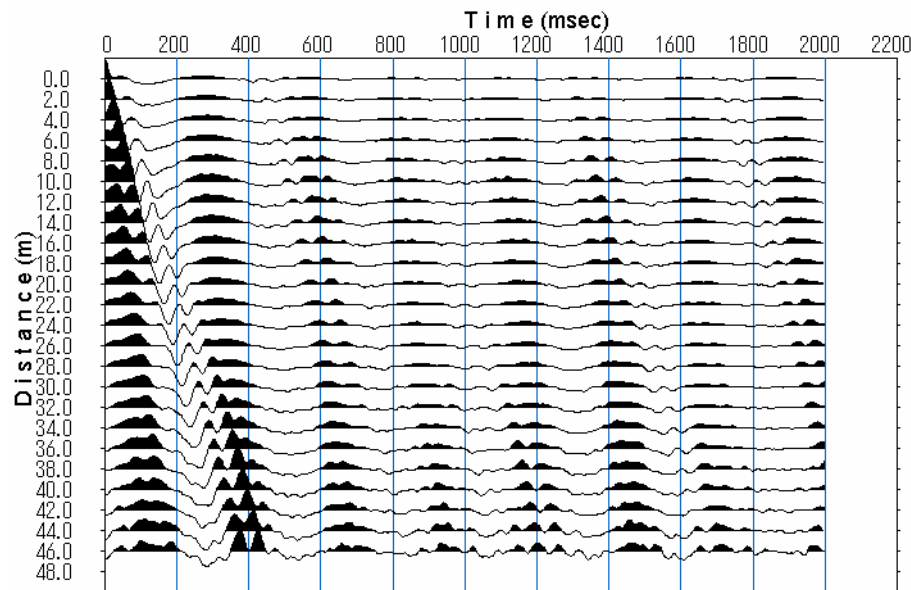


Shaker(MASW1)

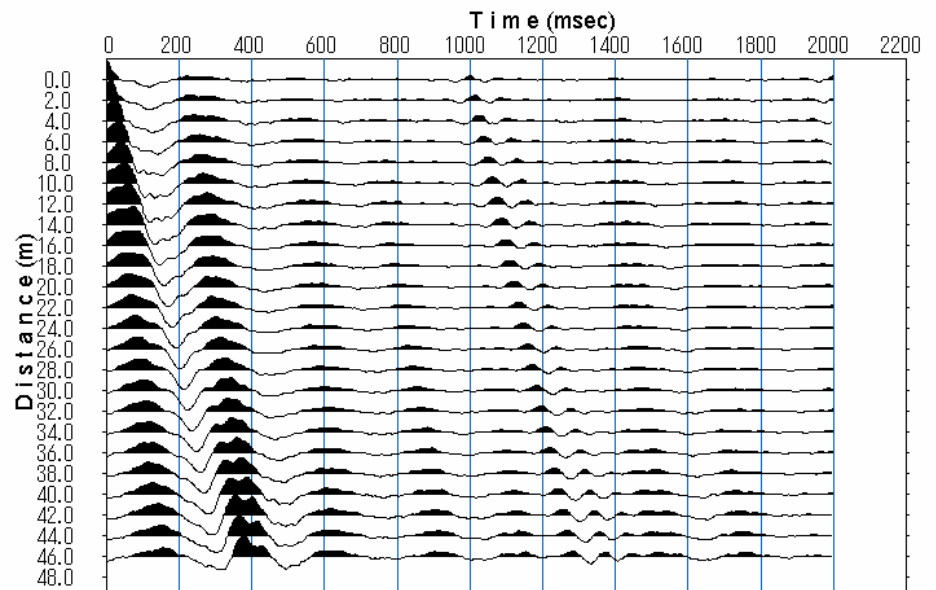


Shaker+MASW (NASW1) Time-domain Waveform

Cross-correlation



Stacked cross-correlation

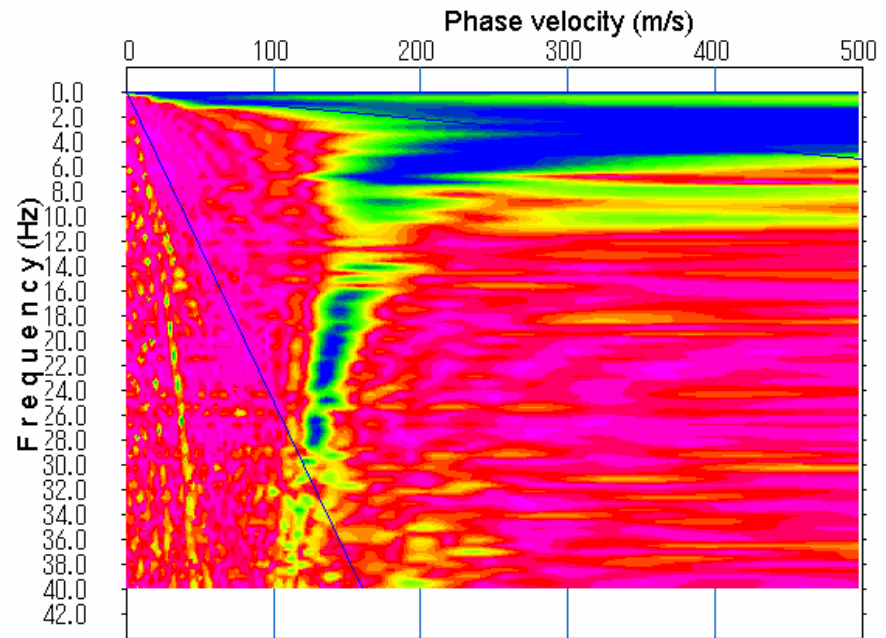
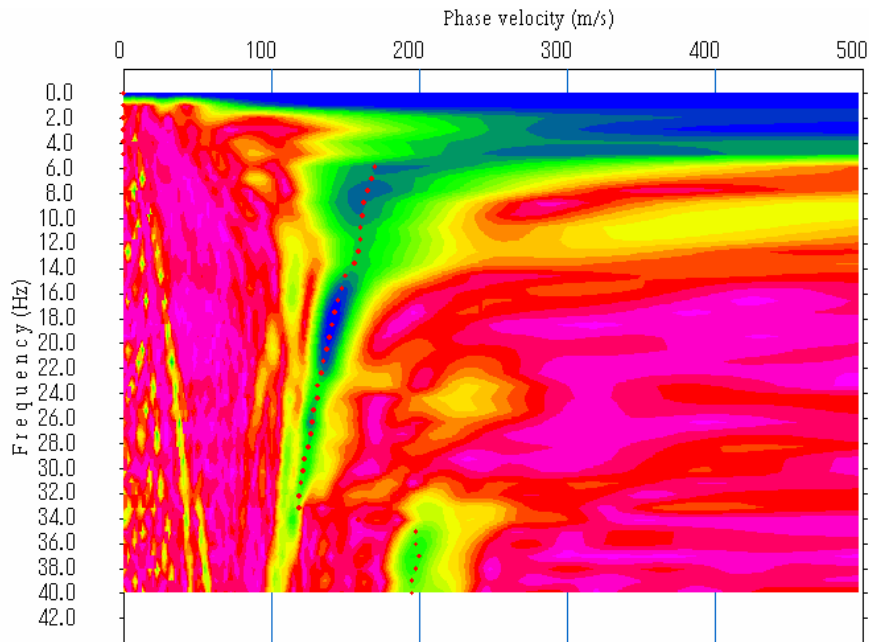


Shaker+MASW (MASW1)

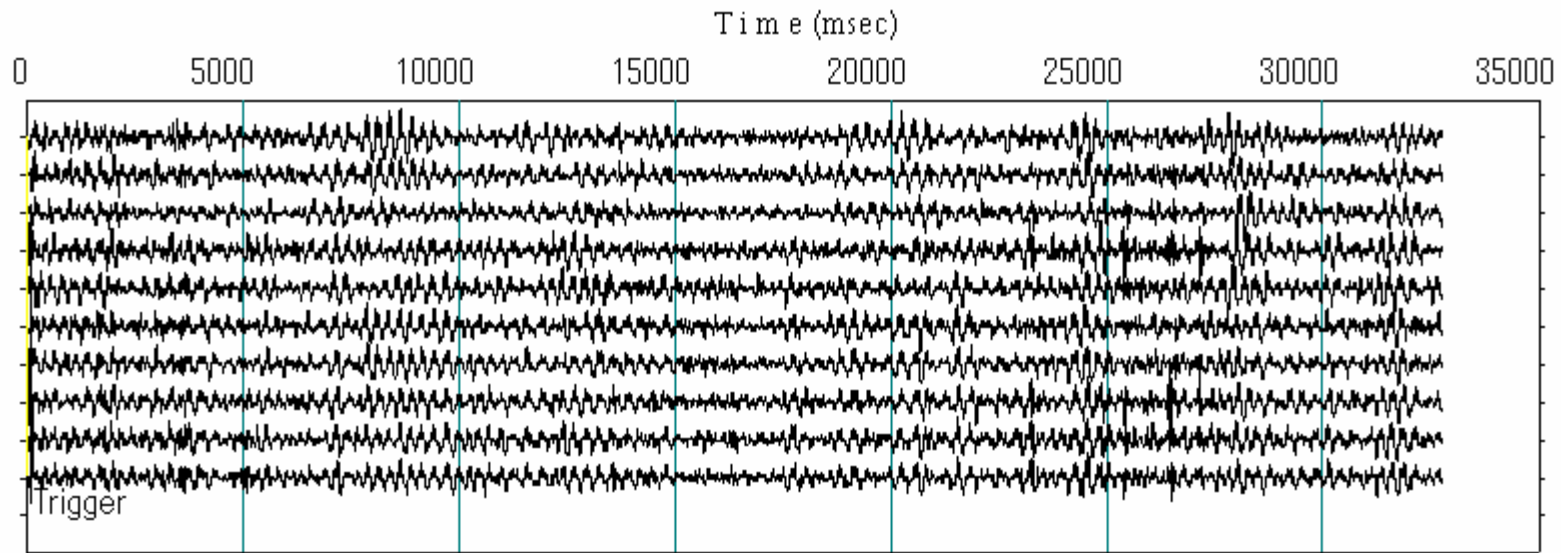
Phase-velocity Image

Sledge hammer(MASW2)

Shaker(MASW1)



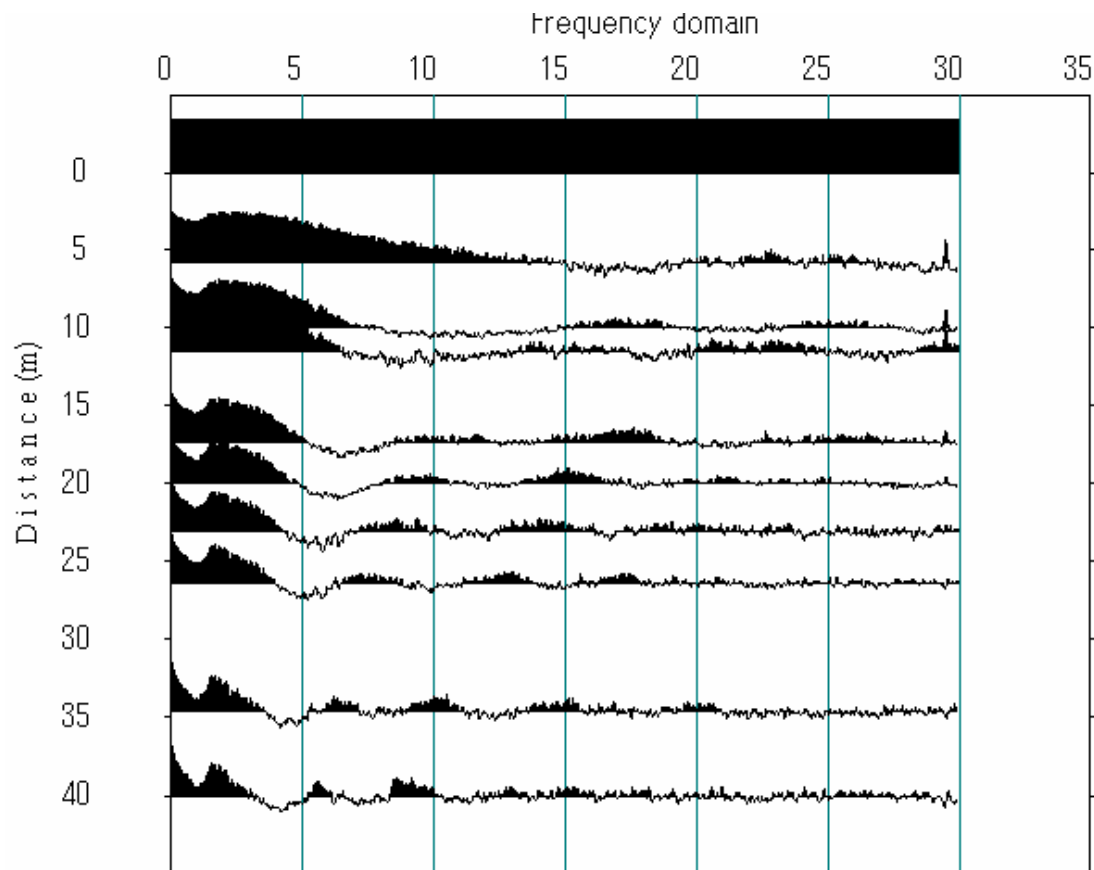
Micro-tremors Array Measurements (MAM) Time-domain Waveform



32 seconds \times 20 data = about 10 minutes

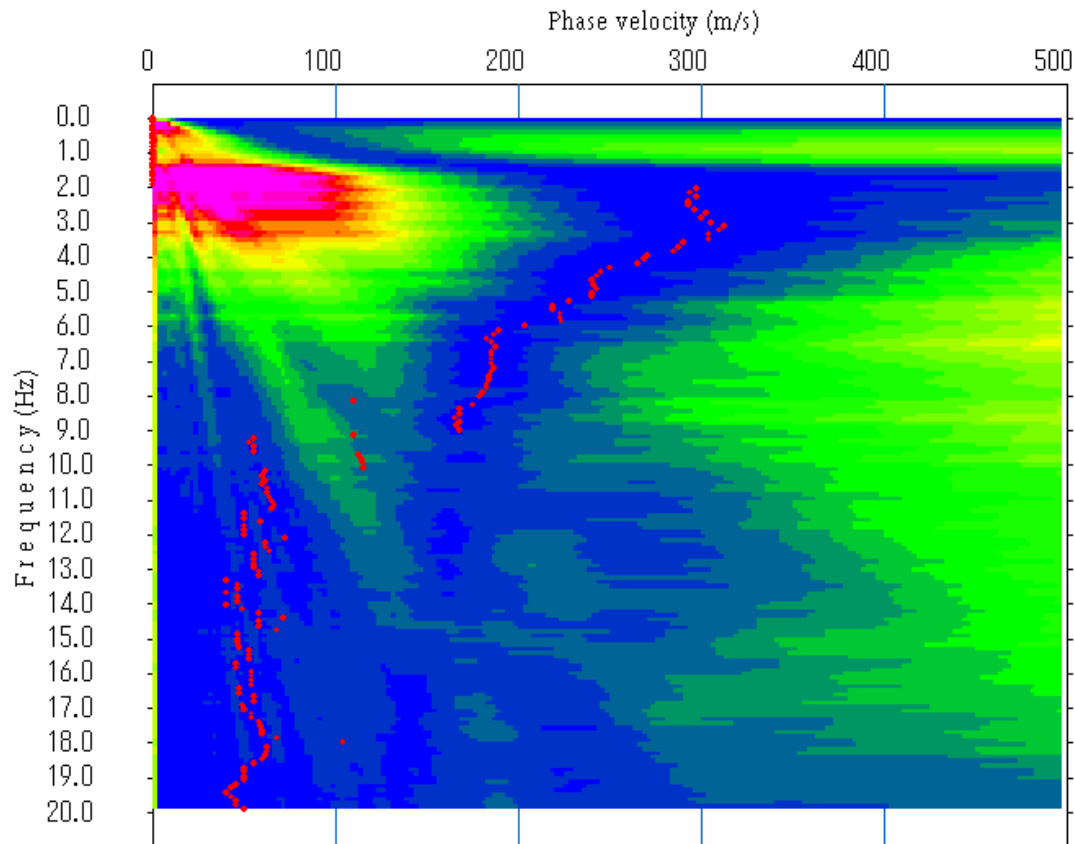
Micro-tremors Array Measurements (MAM)

Spatial Auto-correlation

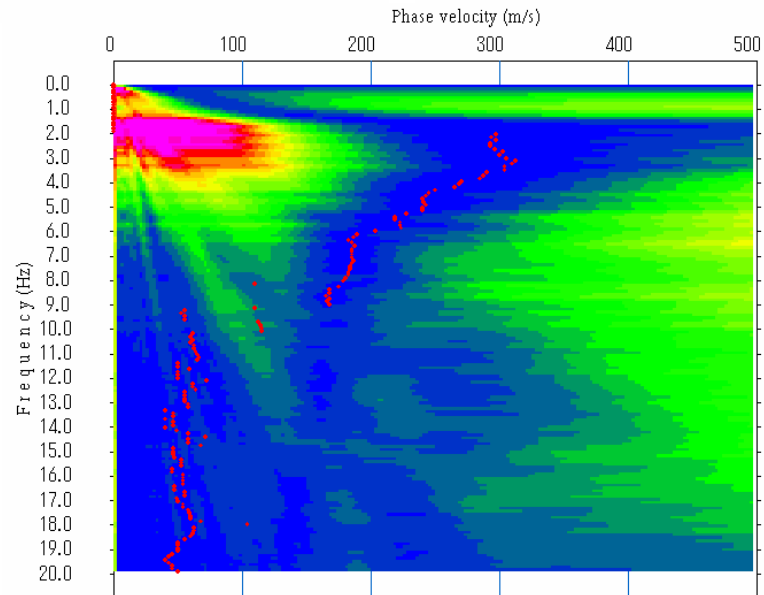
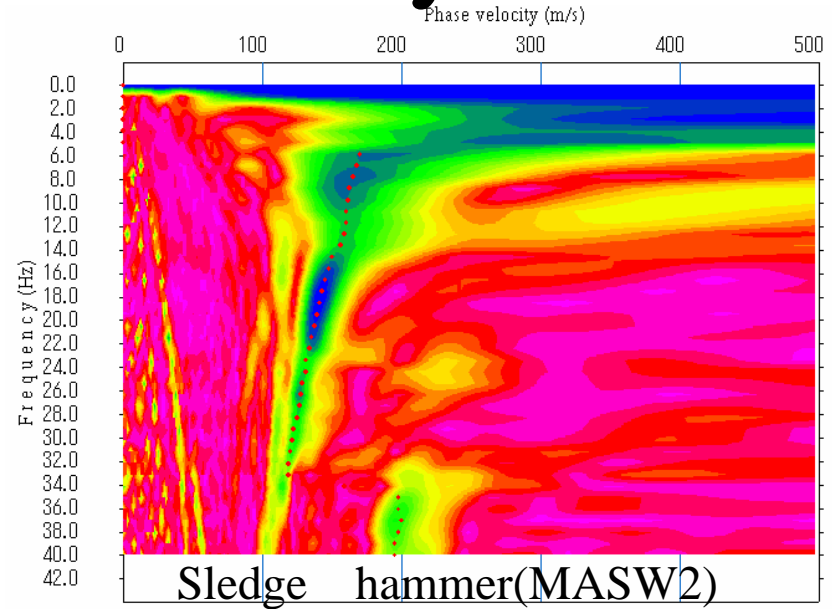
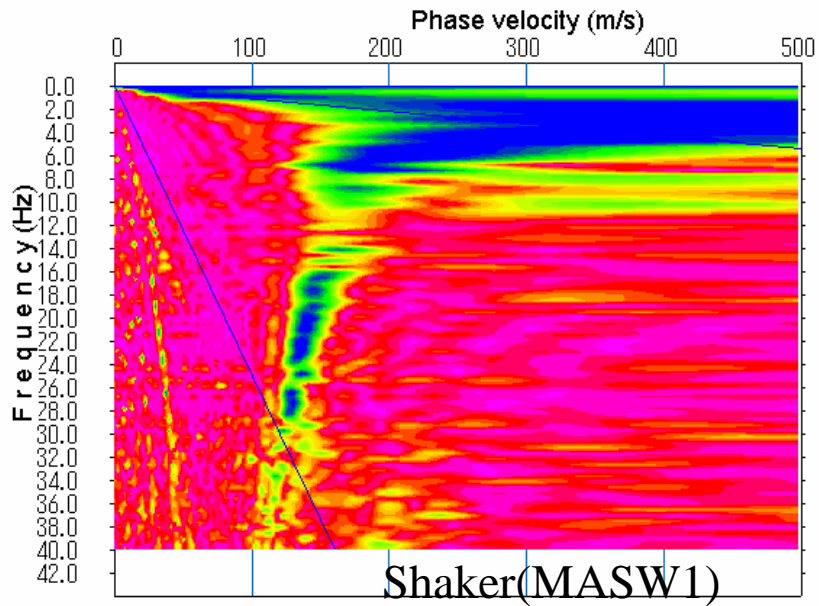


Micro-tremors Array Measurements (MAM)

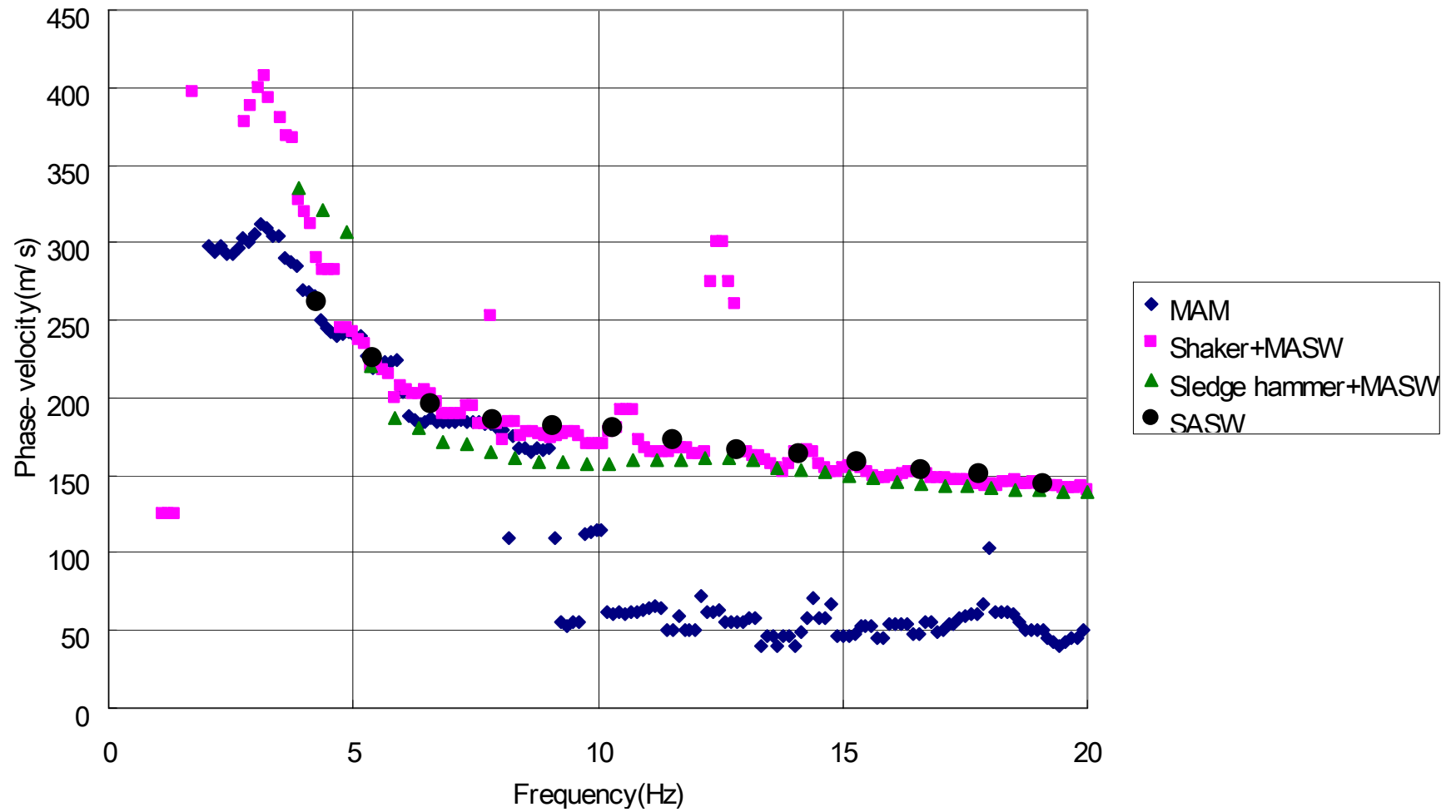
Phase-velocity Image



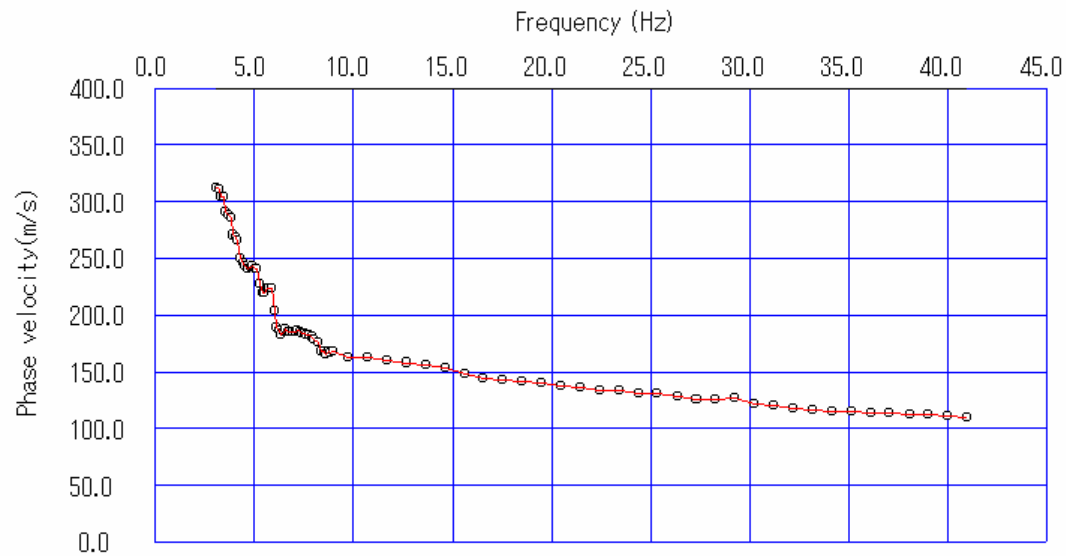
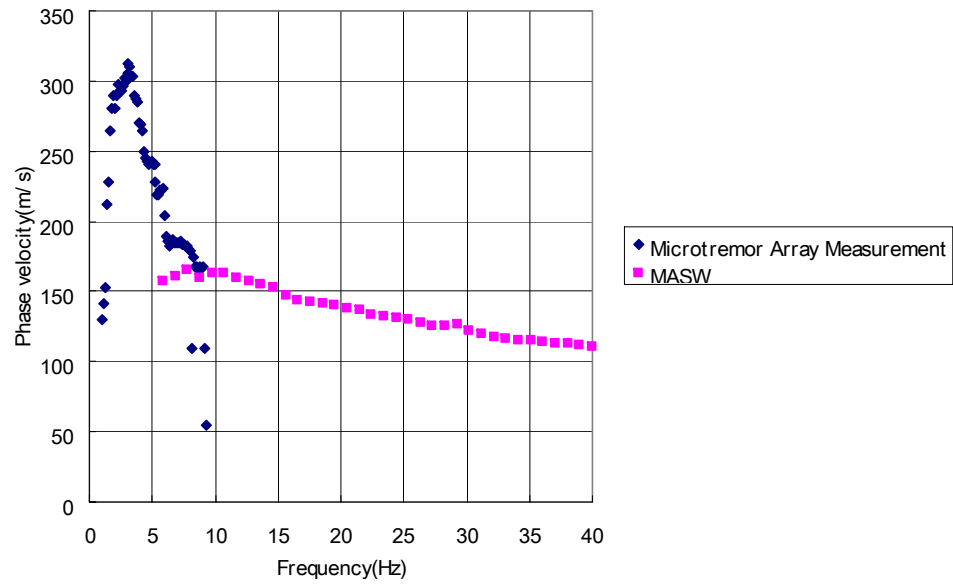
San Jose : Summary



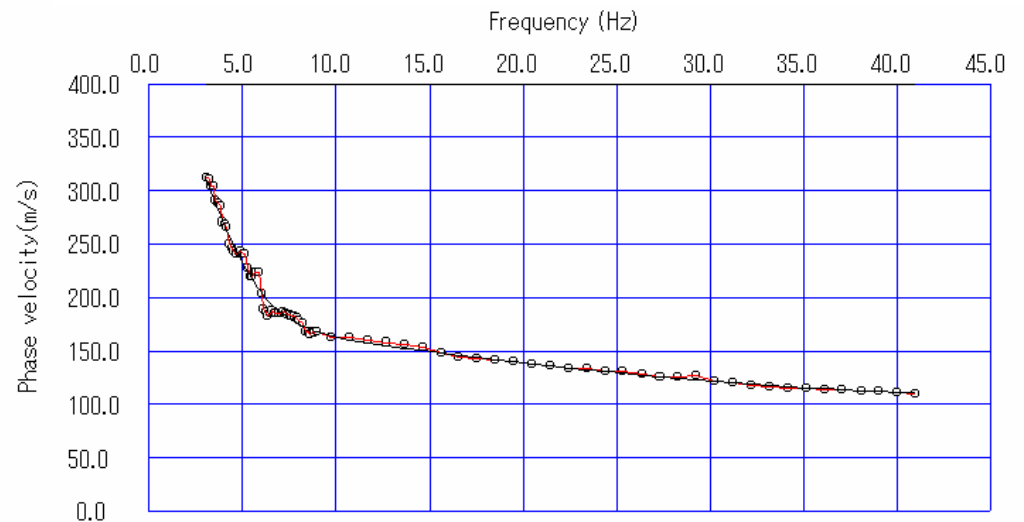
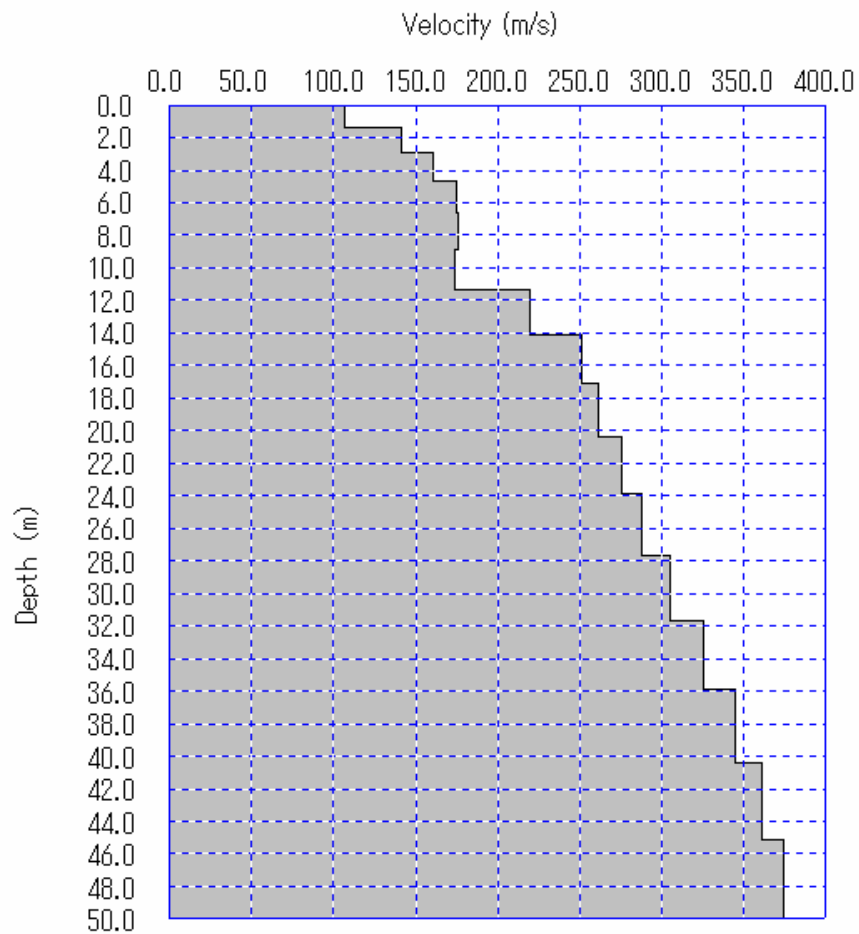
San Jose : Summary



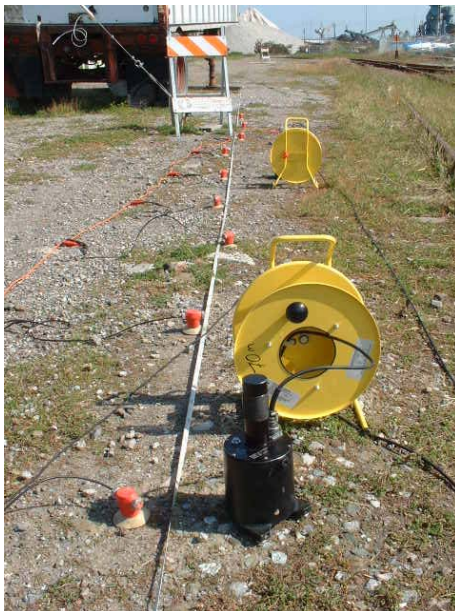
Phase-velocity curve



Analyzed velocity model

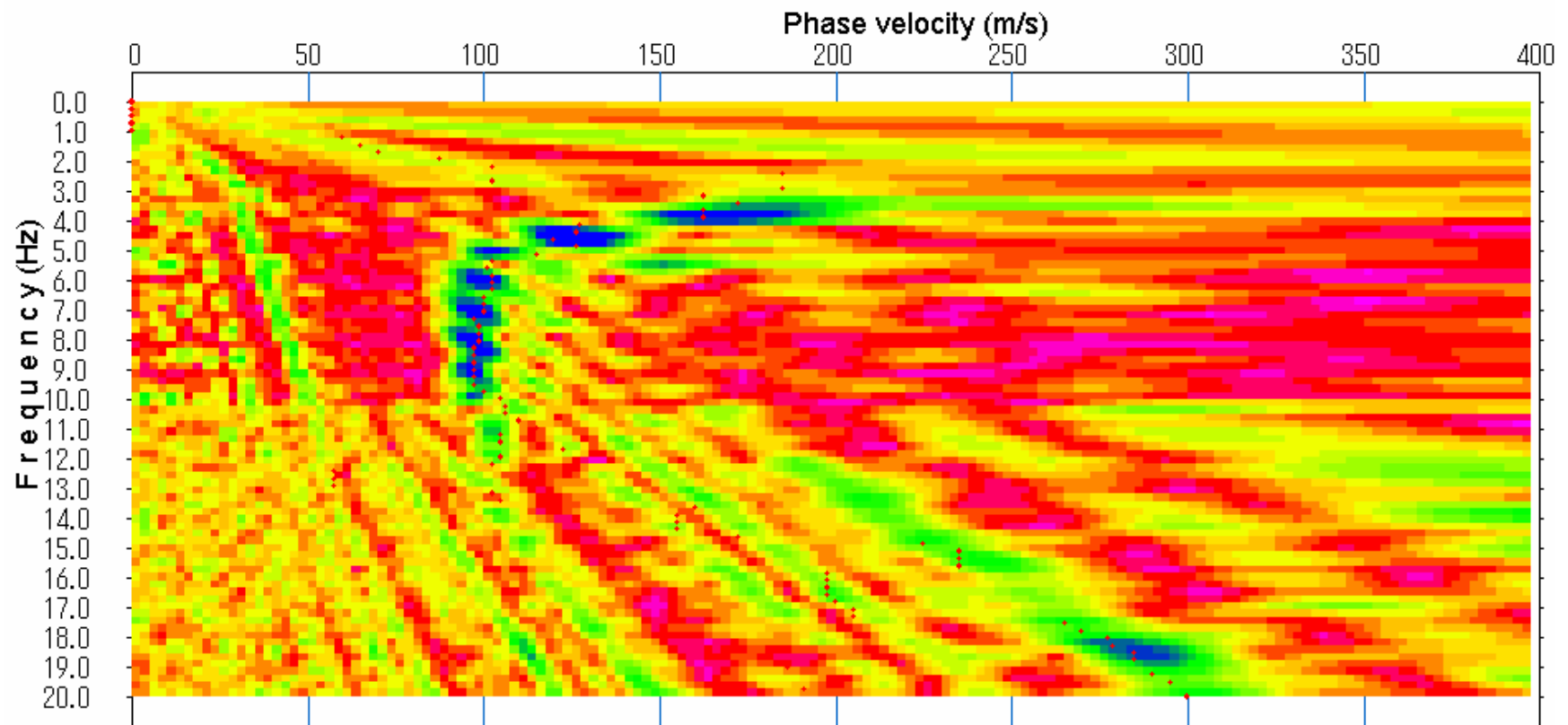


Data Acquisition in Redwood City



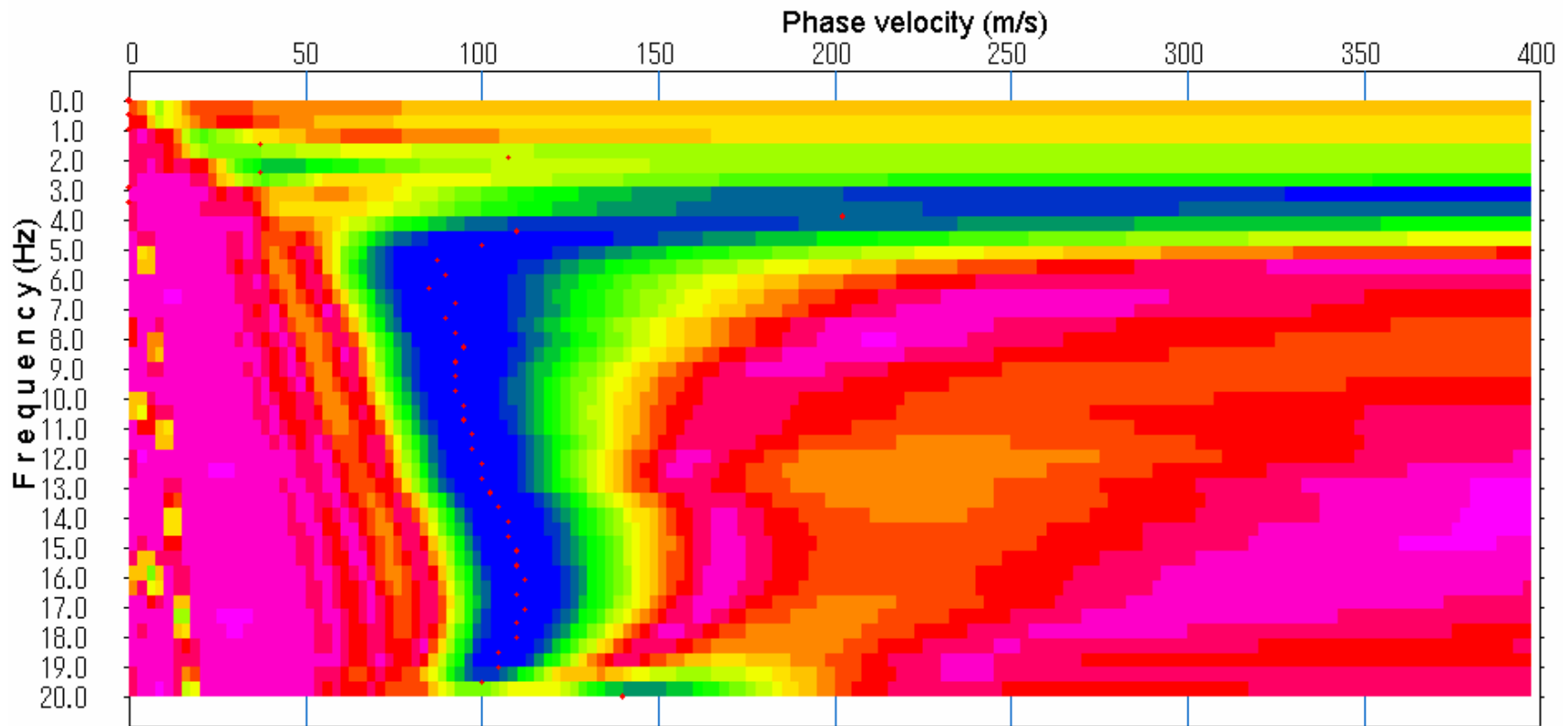
Shaker + MASW (MASW1)

1m spacing by 24 geophones



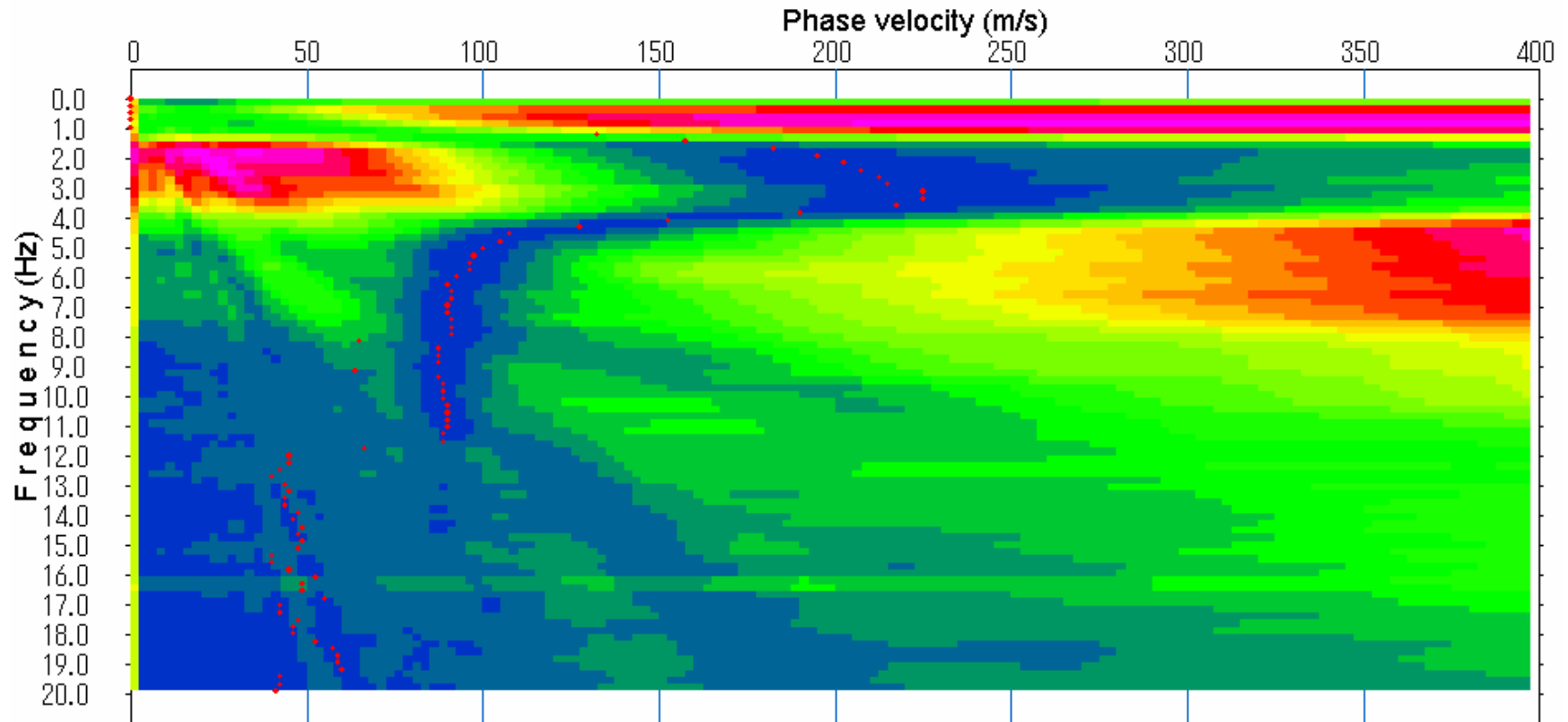
Sledge Hammer + MASW (MASW2)

1m spacing by 24 geophones



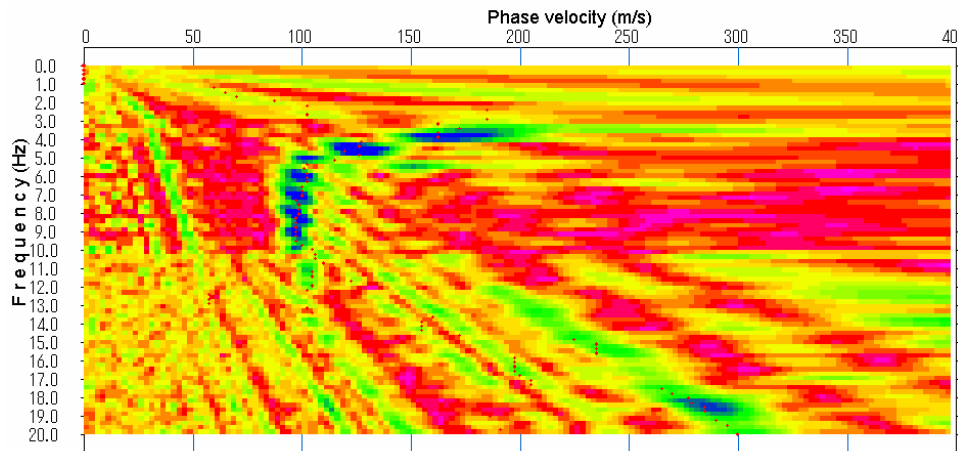
Micro-tremors Array Measurements (MAM)

30m Triangular array, 10 geophones

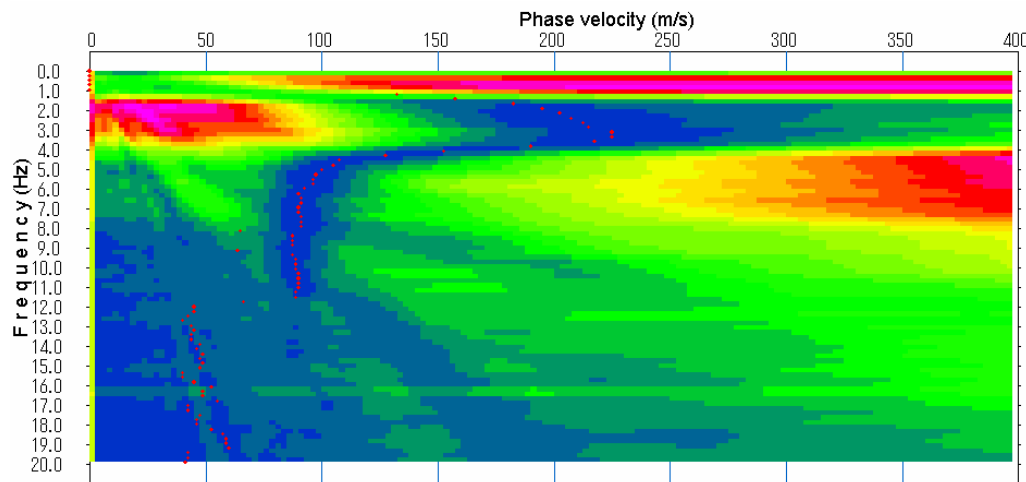
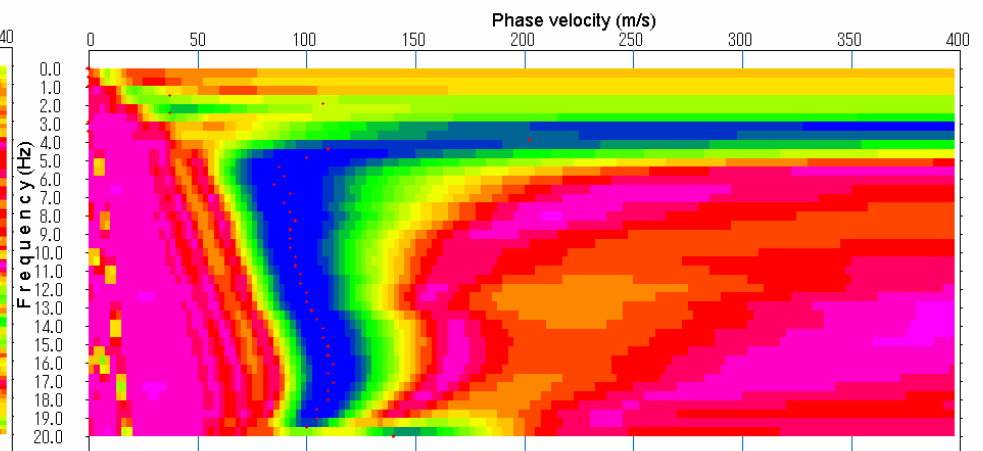


Redwood City : Summary

Shaker(MASW1)

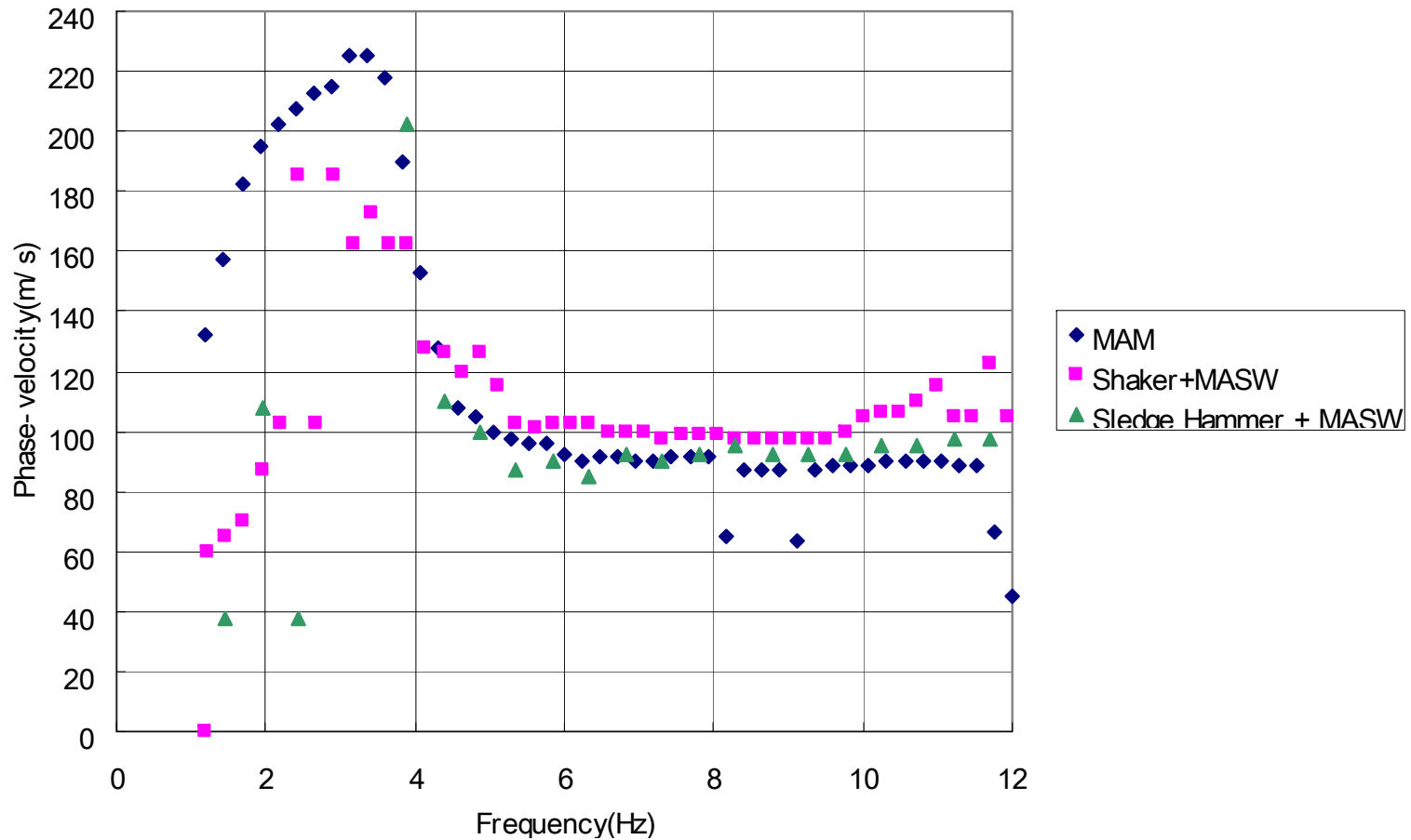


Sledge hammer(MASW2)

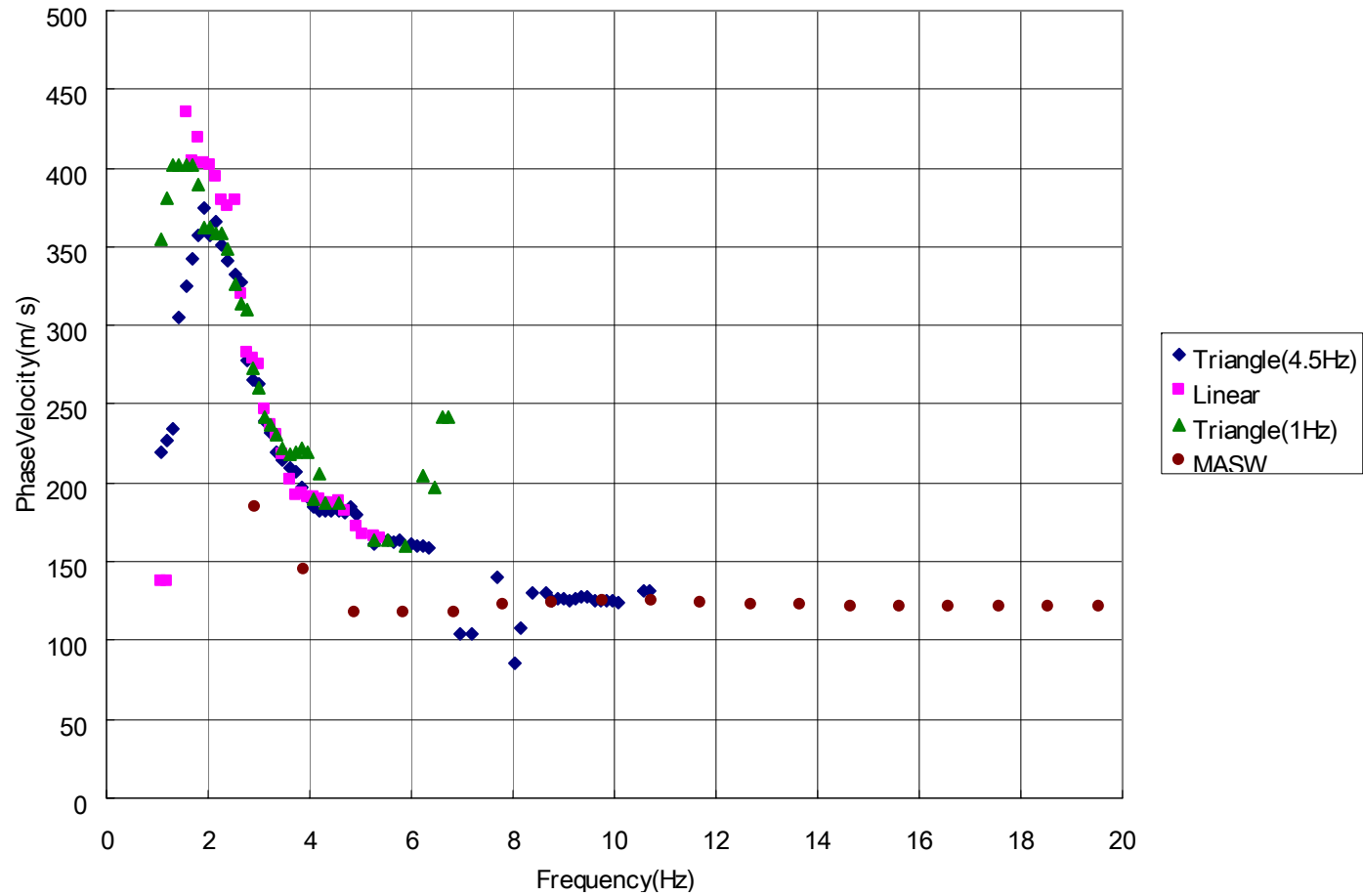


MAM

Redwood City : Summary



Dolphin Park in Los Angeles



Conclusions

- Active dispersion curves agree with passive one in most of sites
- Passive method is much better than active method in low frequency region
- Effect of array shape is relatively small in the passive method
- Large array size and long period geophones are important for deep sounding