Field Investigation of Filtered m-Sequences as Vibroseis Pilots

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Introduction

We conducted field tests using quasi-orthogonal filtered m-sequences as pilot signals to control one, two, and four land vibrators,.

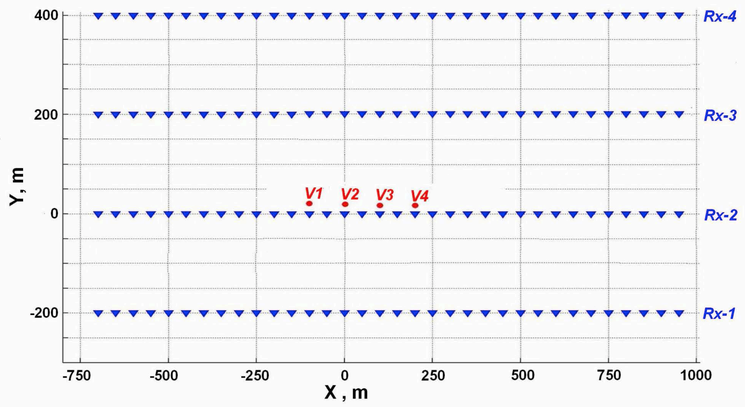

Figure 1: Acquisition geometry for field-testing of quasi-orthogonal filtered m-sequences as Vibroseis pilots. Source spacing is 200m for two-vibrator test, and 100m for four-vibrator test.

Testing One Vibrator

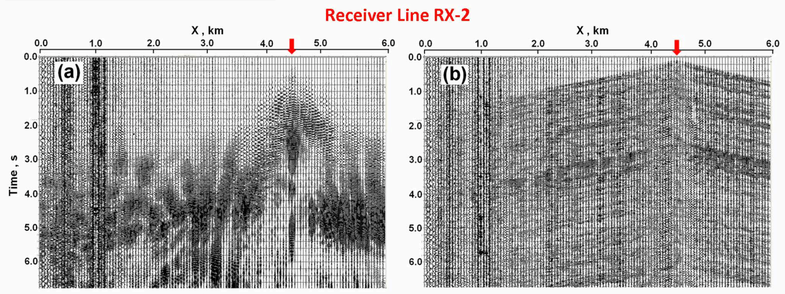

Figure 2: Uncorrelated field data from Receiver Line Rx-2 for single vibrator driven by: (a) linear sweep pilot; (b) filtered m-sequence pilot. Six seconds plotted; full recorded lengths = 22 seconds in both cases.

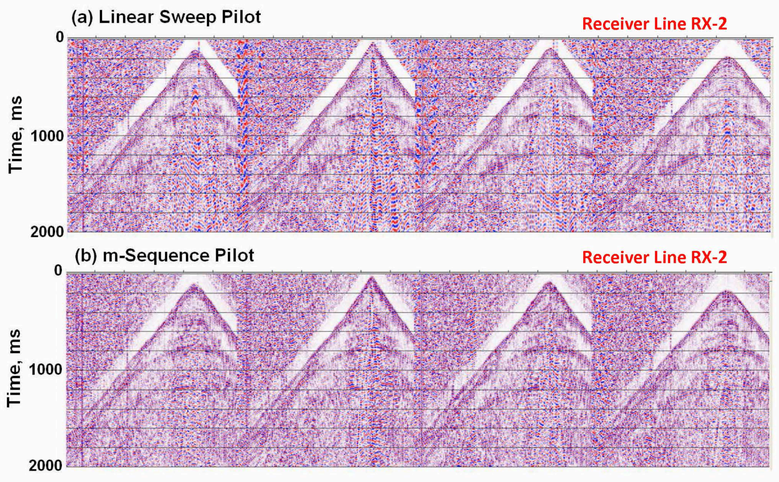

Figure 3: Cross-correlated common-source gathers (CSGs) extracted from uncorrelated field data for Receiver Line Rx-2.

Testing Two Simultaneous Vibrators

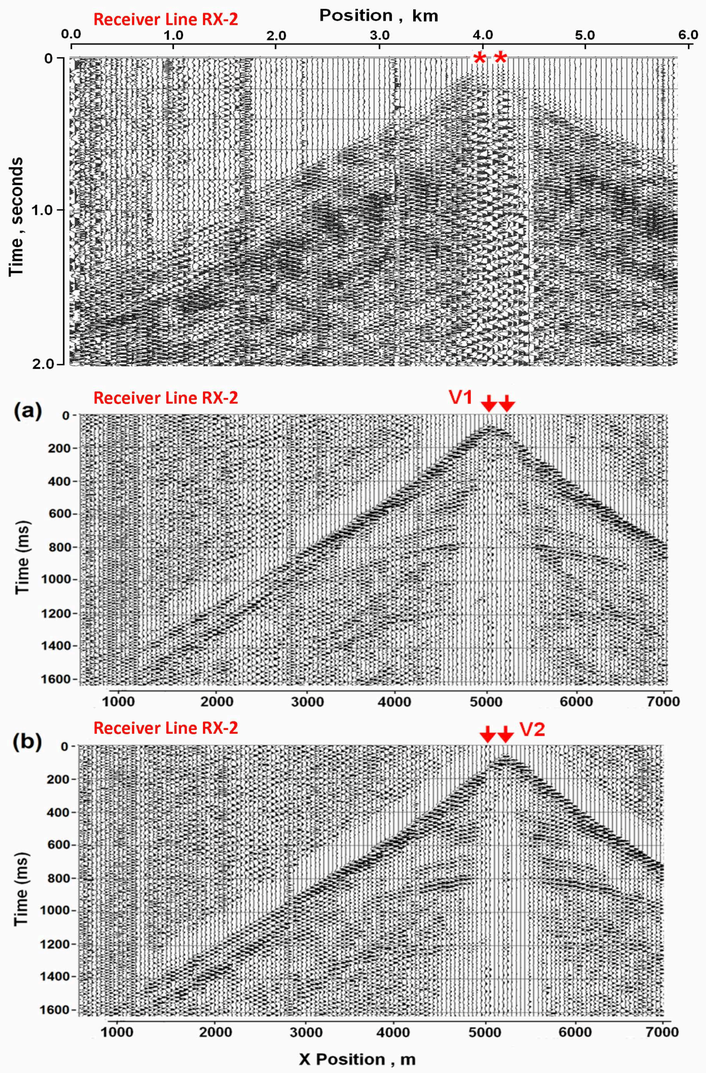

Figure 4: Top: Blended uncorrelated data recorded for two vibrators driven simultaneously by two m-sequence pilots. Bottom: deblended CSGs extracted (a) for vibrator V1; (b) for vibrator V2.

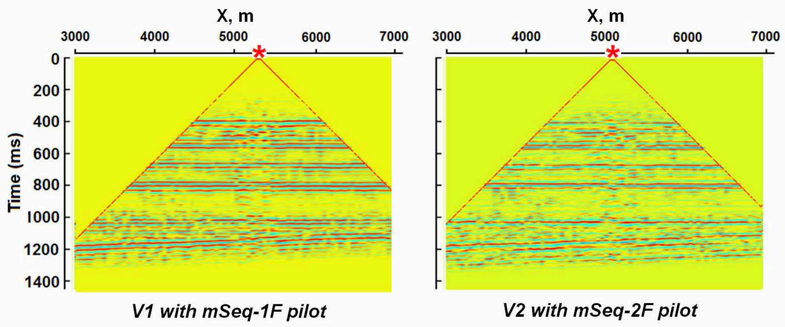

Figure 5: AGC plots of processed deblended CSGs for vibrators V1 and V2 for Receiver Line Rx-2. Red stars indict positions of the two vibrators .

Conclusion: ***Quasi-orthogonal filtered m-sequences are potentially just as effective as linear sweeps in controlling land vibrators, and they can be used for Vibroseis simultaneous multi-sourcing***.

Testing Four simultaneous vibrators

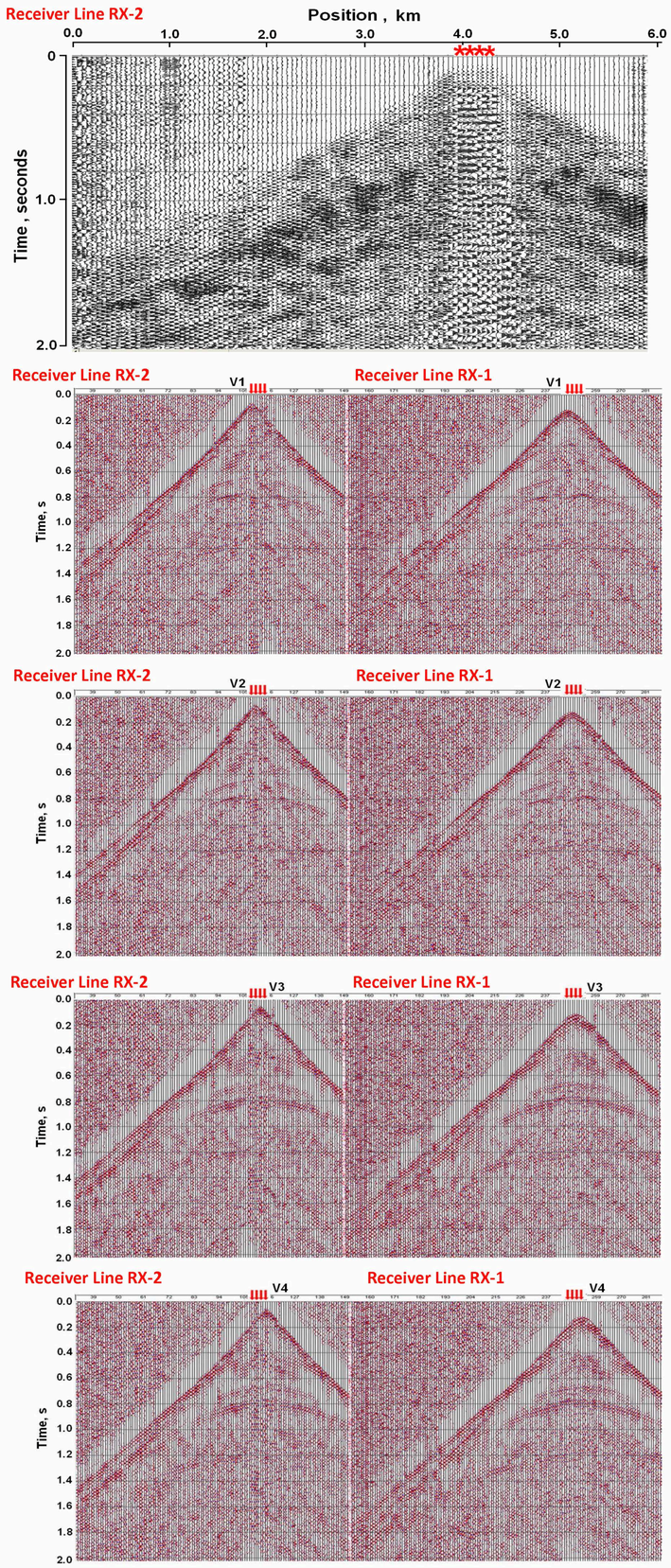

Figure 6: Top: Blended uncorrelated data recorded for four vibrators driven simultaneously by four m-sequence pilots. Bottom: deblended CSGs extracted for vibrators V1, V2, V3, and V4.