PAPER B

THE MRGP OFFSET VSPs

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ABSTRACT

Several VSP gathers were collected and processed for reflections from the McElroy field site. The VSP-CDP mapping algorithm was used to do reflection imaging on five P wave offset VSP gathers and one near offset VSP gather. The final reflection images show numerous coherent reflections.

INTRODUCTION

The VSP-CDP mapping algorithm has been used successfully to image crosswell reflection data (Lazaratos, 1992). However, the original VSP - CDP algorithm comes from the VSP geometry (Lazaratos, 1991). The expected differences in the reflection imaging between crosswell and VSP are primarily the coverage and frequency content . The VSP geometry gives us a larger region of coverage, but we lose a significant amount of frequency content due to the ray path distance and near surface attenuation.

VSP-CDP REFLECTION IMAGES

The location of each of the VSP surveys is shown in figure 1. The survey geometry is shown in figure 2. Survey A is the near offset survey. Surveys B, C, D, E, and F have 1800 ft. horizontal offsets between their respective surface source locations and the receiver well. The receiver spacing in the common receiver well (well 1202) is 50 ft, with the depth range from 900 ft. to 3000 ft for surveys A and C, 950 ft. to 3150 ft. for surveys B and D, and 1500 ft. to 3000 ft. for surveys E and F. The pre-processed data for survey B is shown in figure 3. We see several reflections in the pre-processed data. The VSP-CDP mapping algorithm is applied to each of these surveys to obtain reflection images. The reflection image for survey A is shown in figure 4. We see a number of reflections in the near offset image. Figure 5 shows the reflection image for survey B. Figure 6 shows the reflection image for survey B after f-k and bandpass filtering. We again see a number of

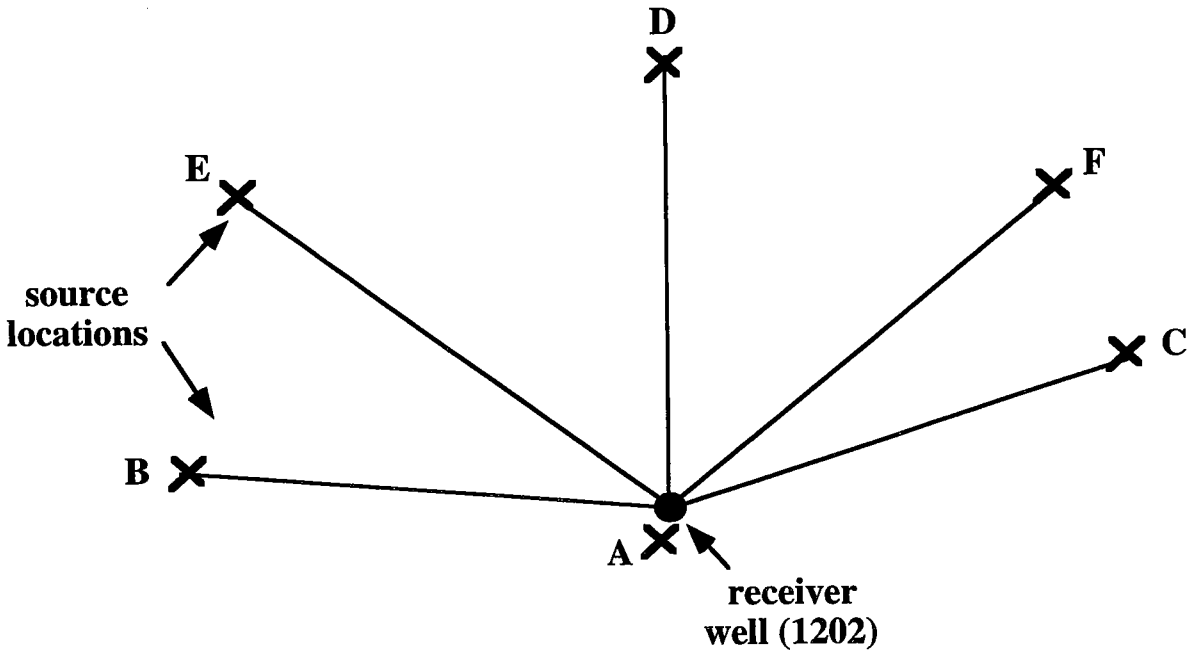

Figure 1. Survey locations.

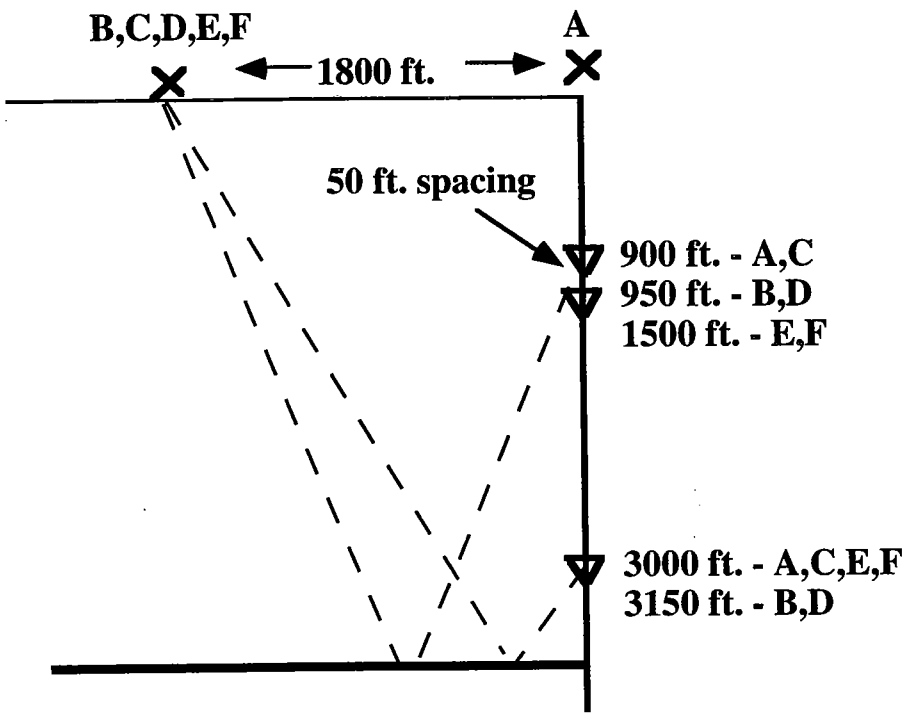

Figure 2. Survey geometry.

coherent reflections in the final image. The additional filtering has made the reflections more coherent and continuous. Figures 7-10 shows the final refection images for surveys C, D, E, and F after mapping and f-k and bandpass processing. Figure 11 shows all of the reflection images together. We see similarities in the basic reflection structure as well as some differences in the images. Survey A has higher vertical resolution since it is the near offset survey, and doesn't suffer from the non-linear stretch that the 1800 ft. offset surveys have in the reflection mapping procedure. We see stronger reflections in the upper part of the images (above 2000 ft.). Between 2000 and 3000 ft. we see finer, more closely banded reflections.

CONCLUSIONS

We have successfully applied the VSP-CDP mapping algorithm to five offset VSP gathers, and a near offset VSP with a common receiver well to produce six single gather reflection images. Each of these reflection images show coherent reflection events which compare favorably in terms of basic structure.

REFERENCES

Lazaratos, S., Rector, J.W., Harris, J.M., and Van Schaack, M., 1992, High Resolution Imaging of a West Texas Carbonate Reservoir, STP. vol. 3, No. 1, Paper E.

Lazaratos, S., Rector, J.W., Harris, J.M., and Van Schaack, M., 1991, High Resolution Imaging with Crosswell Reflection Data, STP. vol. 2, No. 1, Paper A.

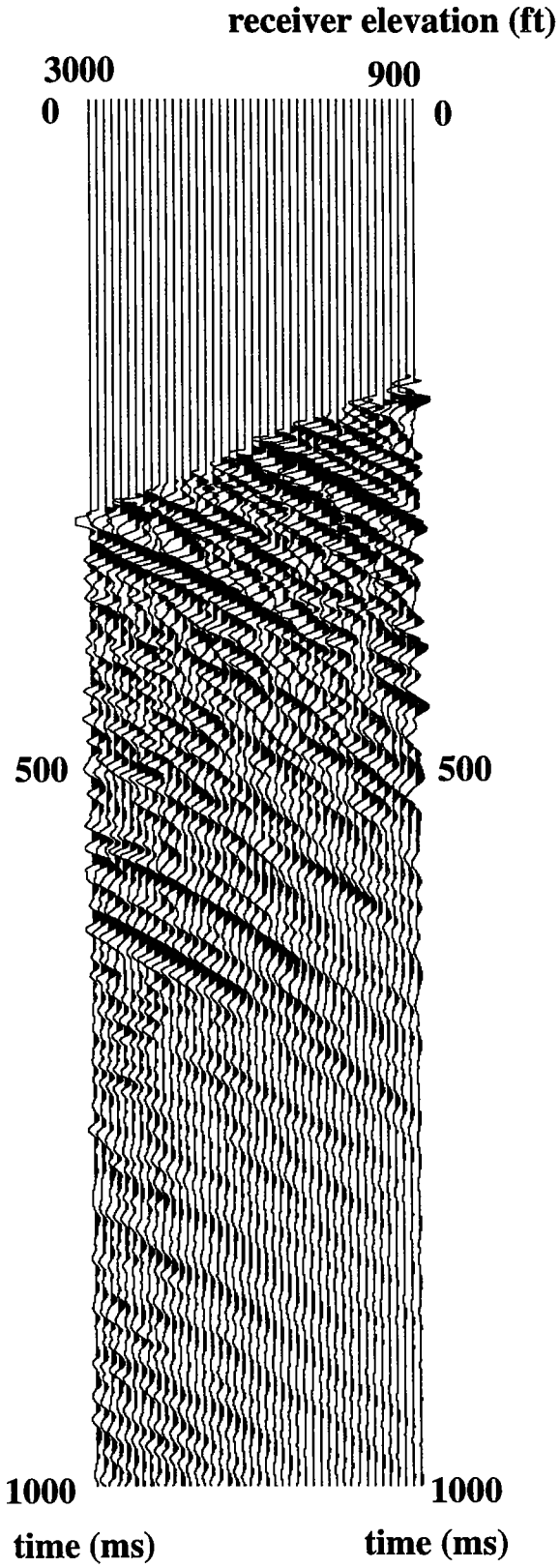

Figure 3. Survey B Pre-Processed data.

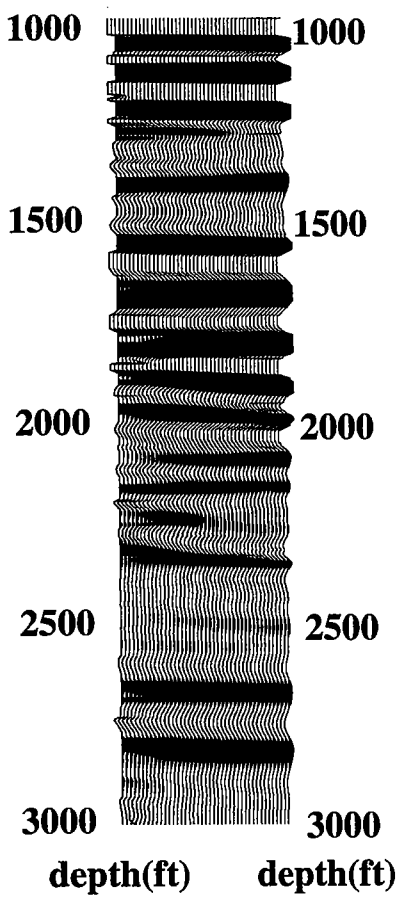

Figure 4. Reflection Image for Survey A.

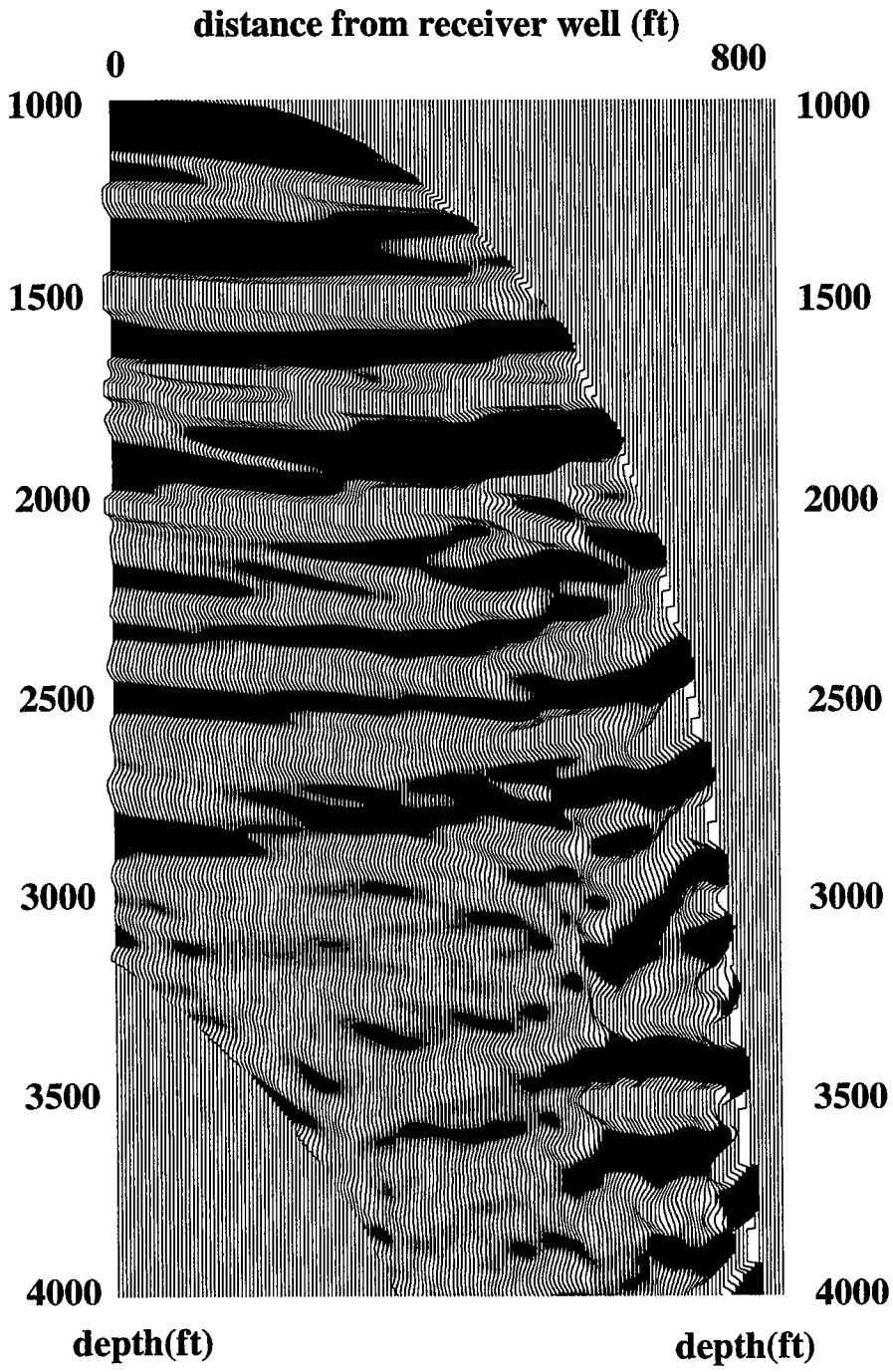

Figure 5. Reflection Image for Survey B.

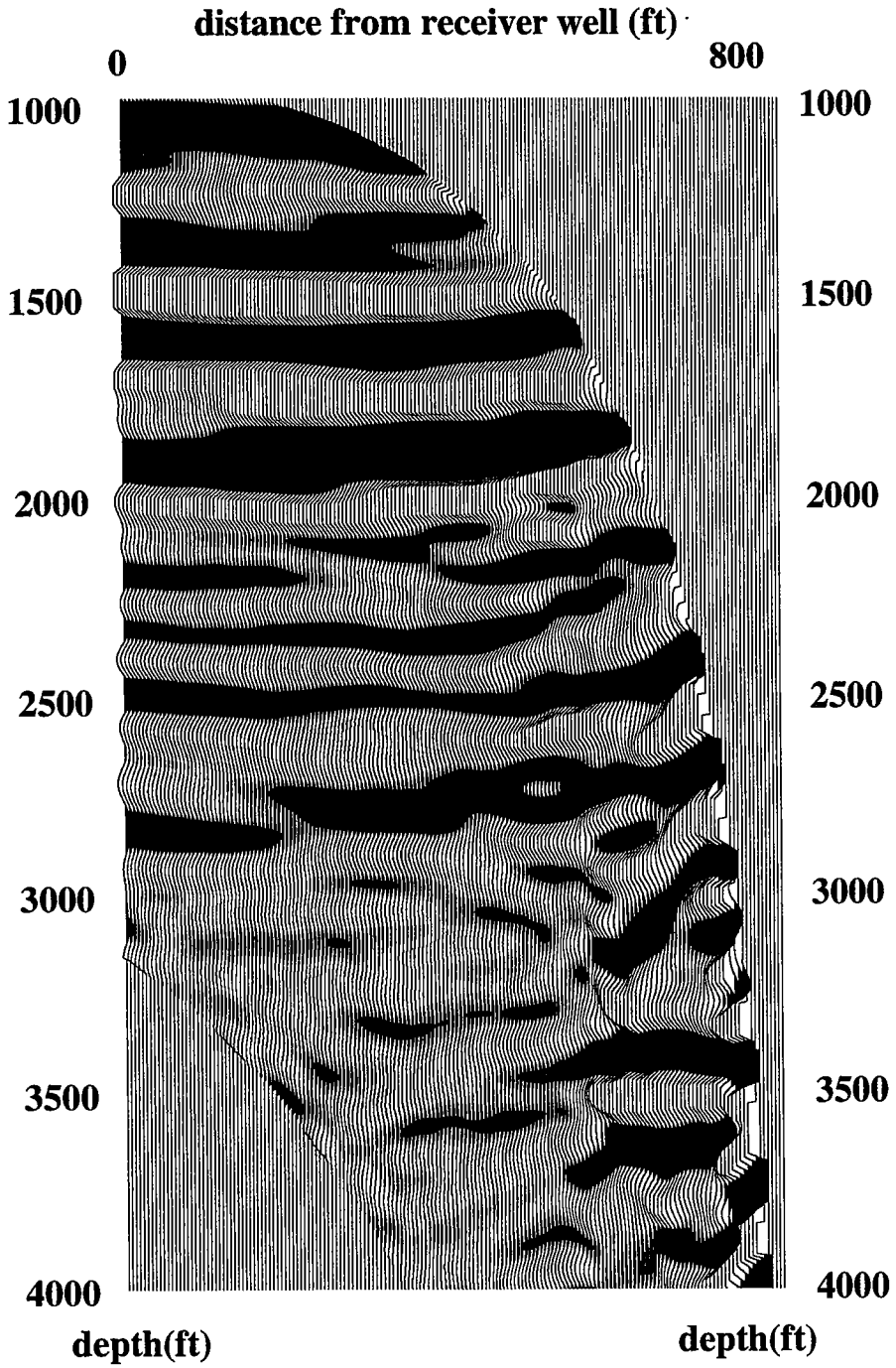

Figure 6. Reflection Image for Survey B after additional filtering.

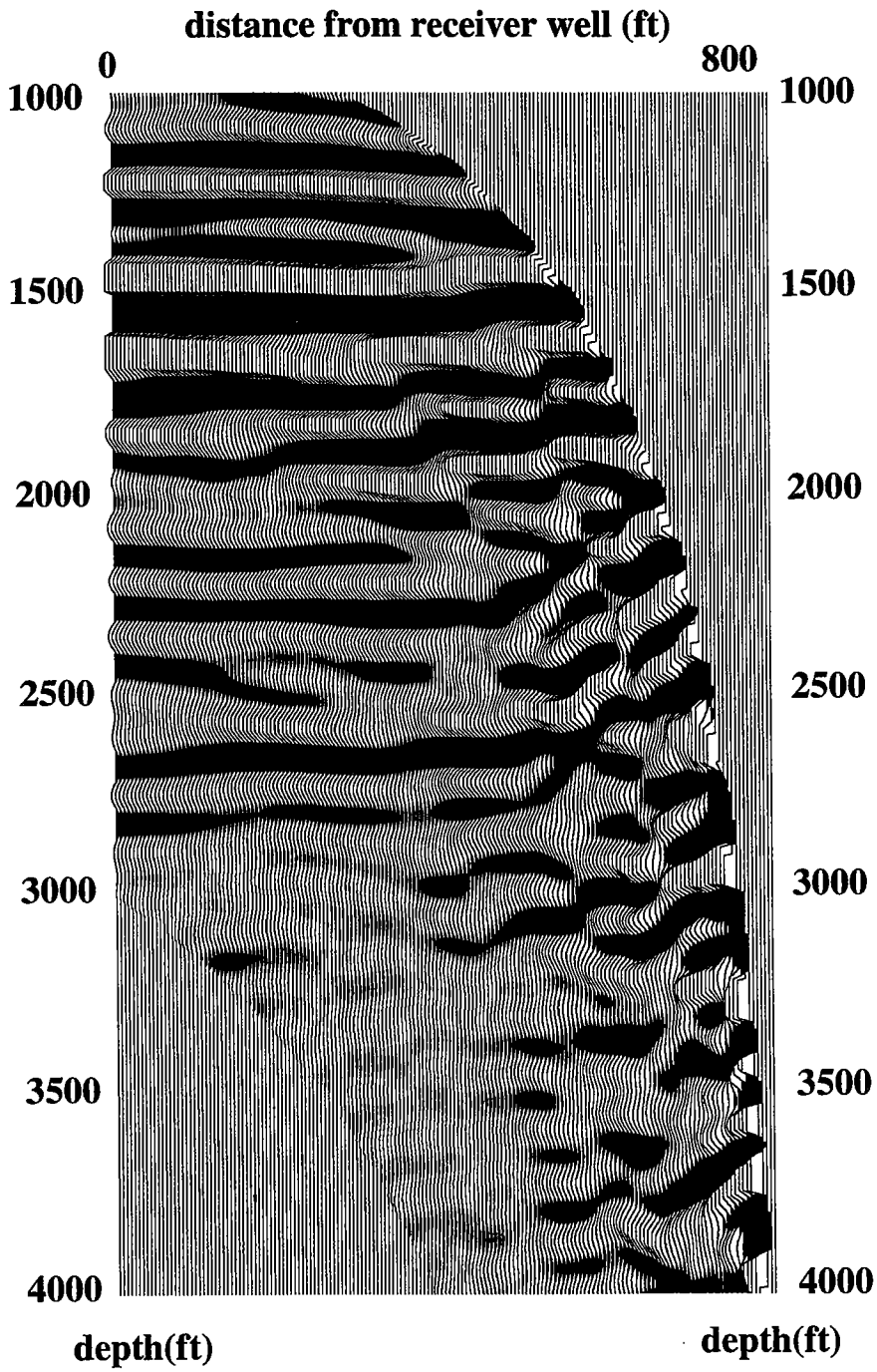

Figure 7. Reflection Image for Survey C.

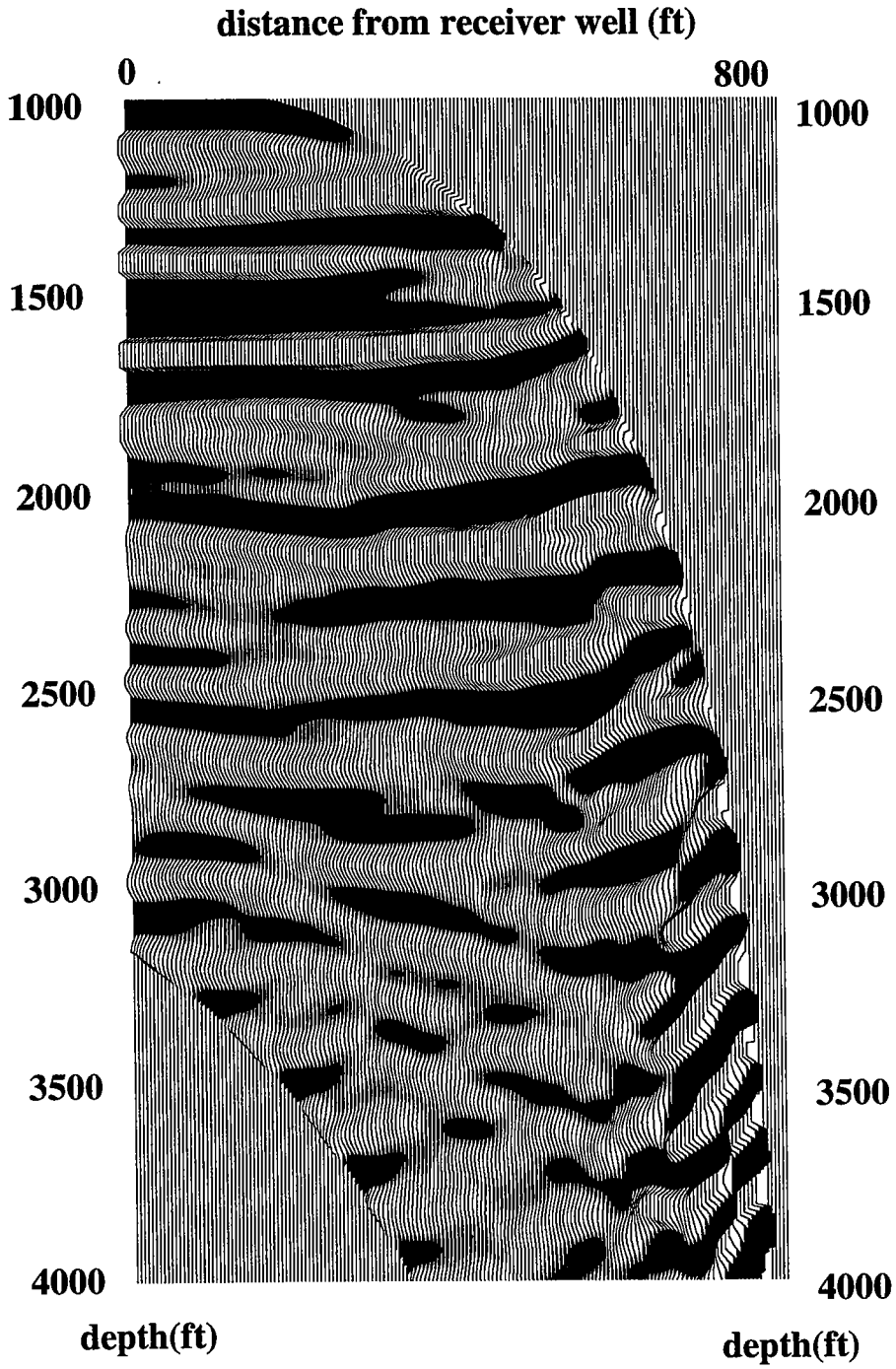

Figure 8. Reflection Image for Survey D.

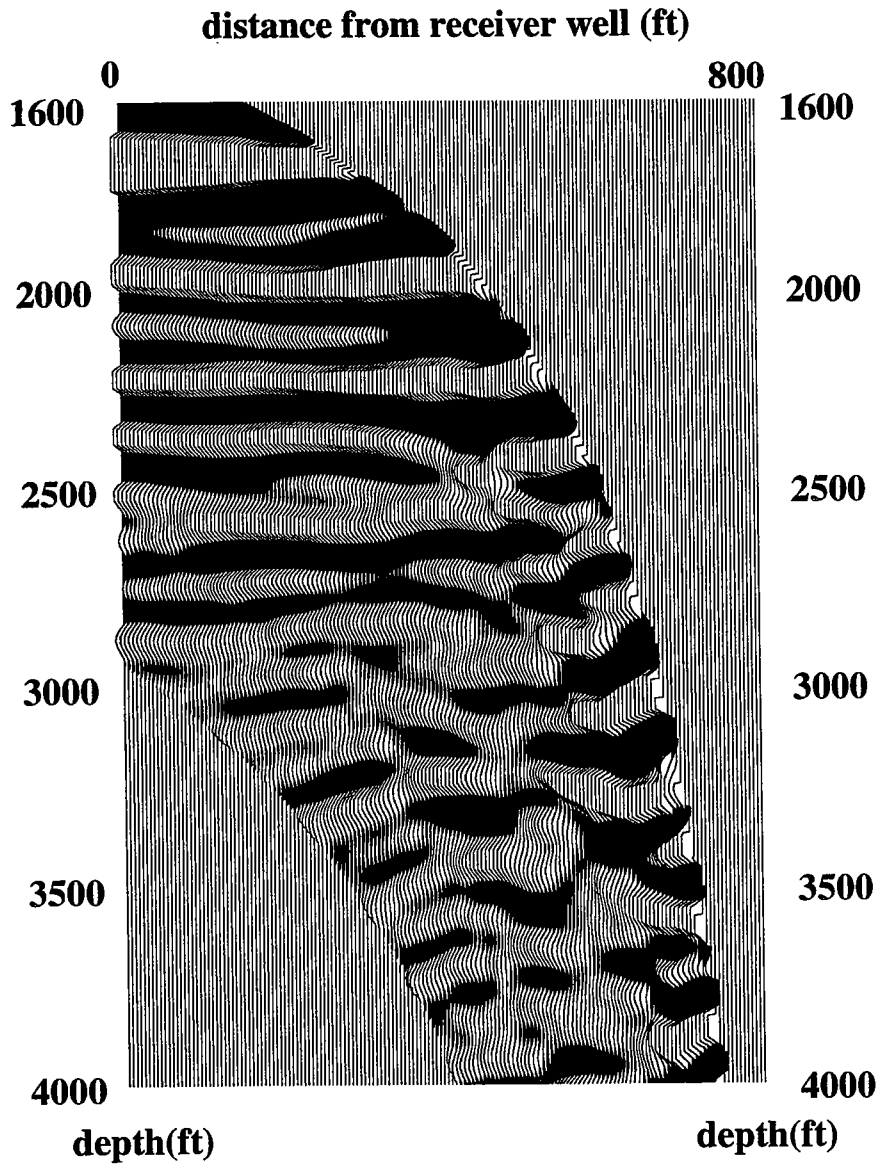

Figure 9. Reflection Image for Survey E.

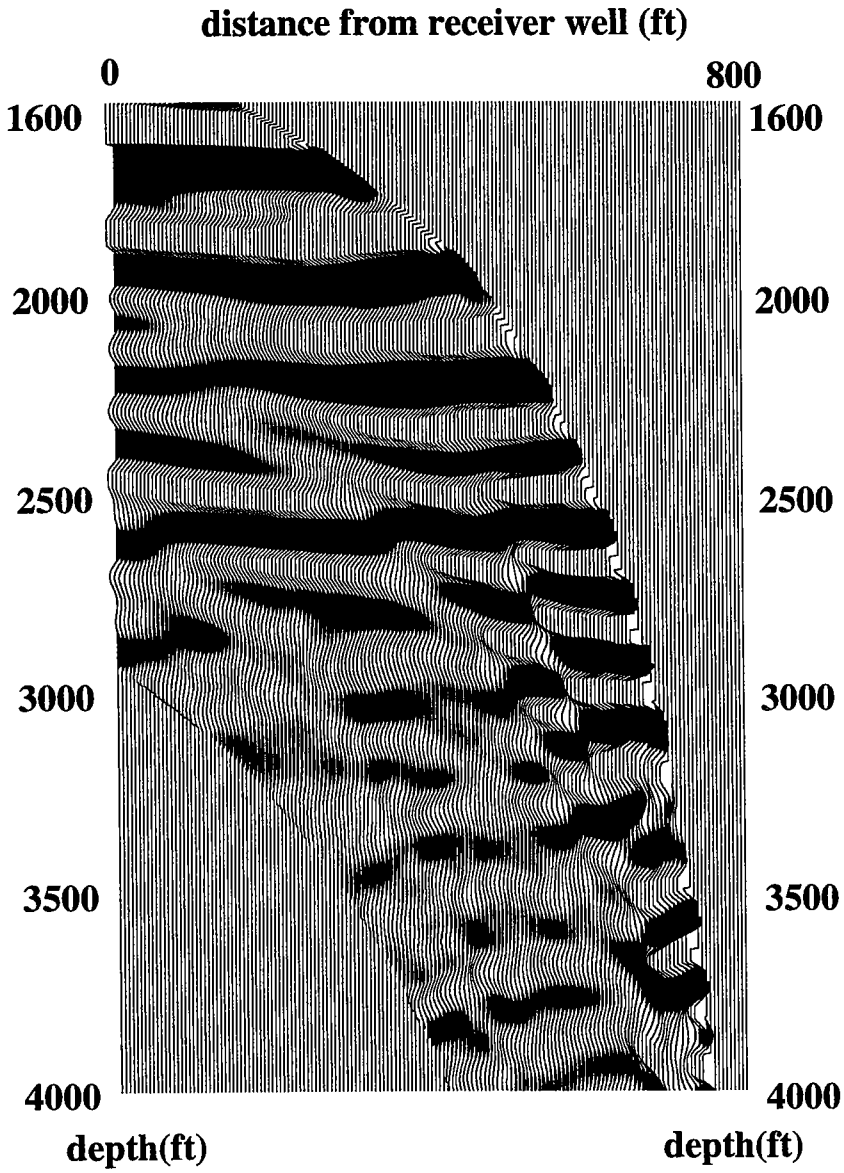

Figure 10. Reflection Image for Survey F.

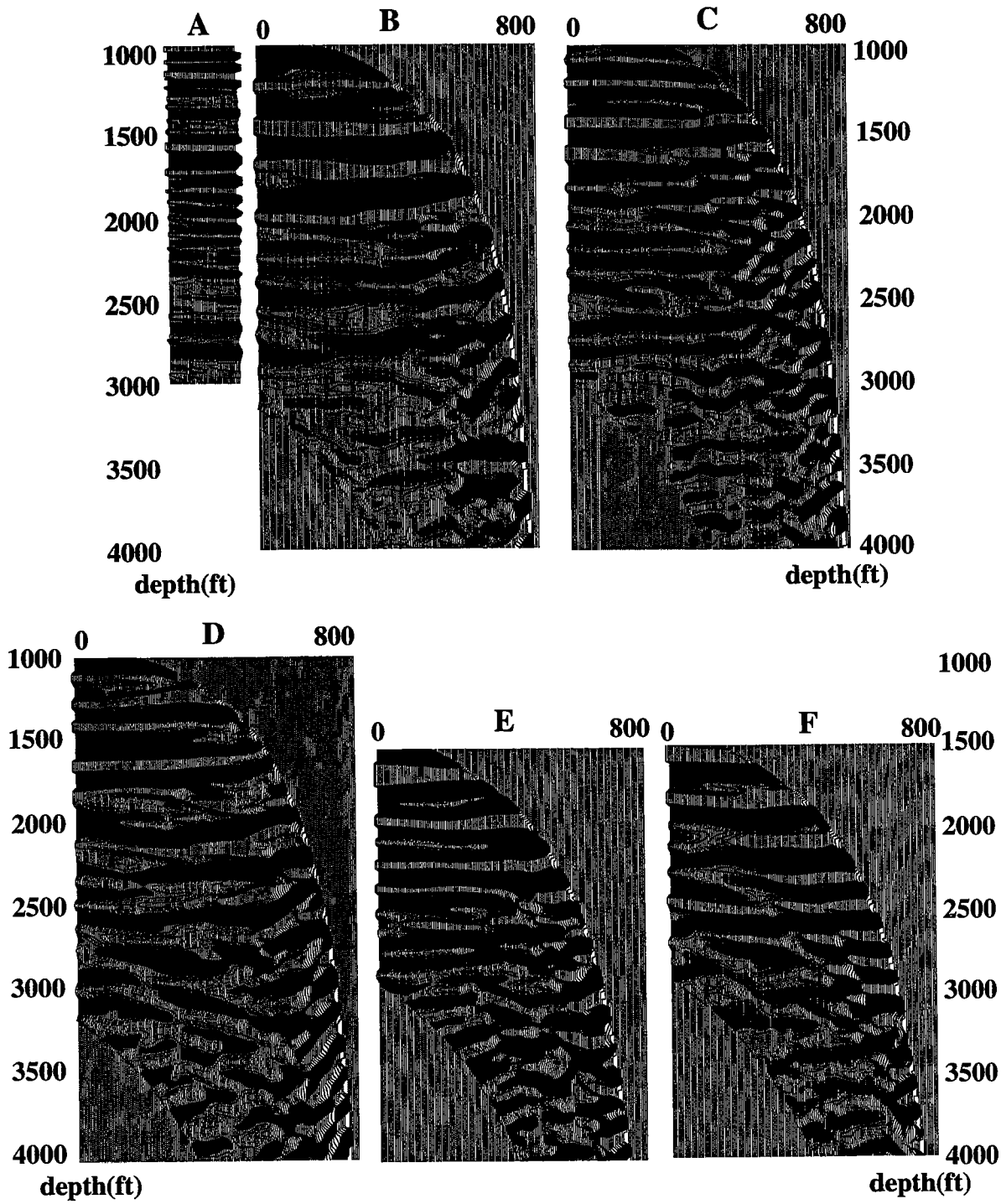

Figure 11. Comparison of the VSP images.