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OPTIMIZING RESOURCES

Utilizing VSP for Suppressing Surface Seismic Multiples

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Summary

There are many applications for a Vertical Seismic Profiling (VSP) data. One very good thing about zero offset VSP is that mulitples in general can be easiliy identified and consquently removed. As it is elaborated in this work, this understanding of mutliples pattern may also enable us to effectively attack the residual multiples that are still alive in surface seismic data.

Theory and/or Method

A VSP data is comprised of Down-Goings (DG) and Up-Goings (UG) wavefields. Eventough the desired refletction waves are always in UG but DG are far more stronger in terms of amplitude (Figure 1). The intresting pheneomenom is that in a simple gelogy with amlost flat layers the time lags between primaries and multiples are equal in both DG and UG (Figure 2) . That enable us to design effective deconvolution operators from DG that has stronger amplitude and apply them on UG. In this work it has been shown that the operators can also be fine tuned for suppressing residual multiples in surface seismic data.

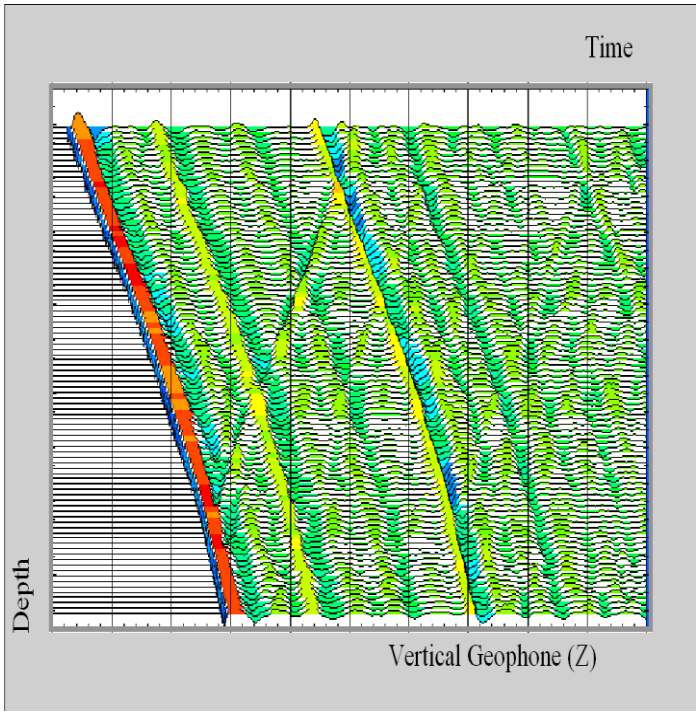

Figure 1, DG with stronger amplitude and UG with weaker amplitude

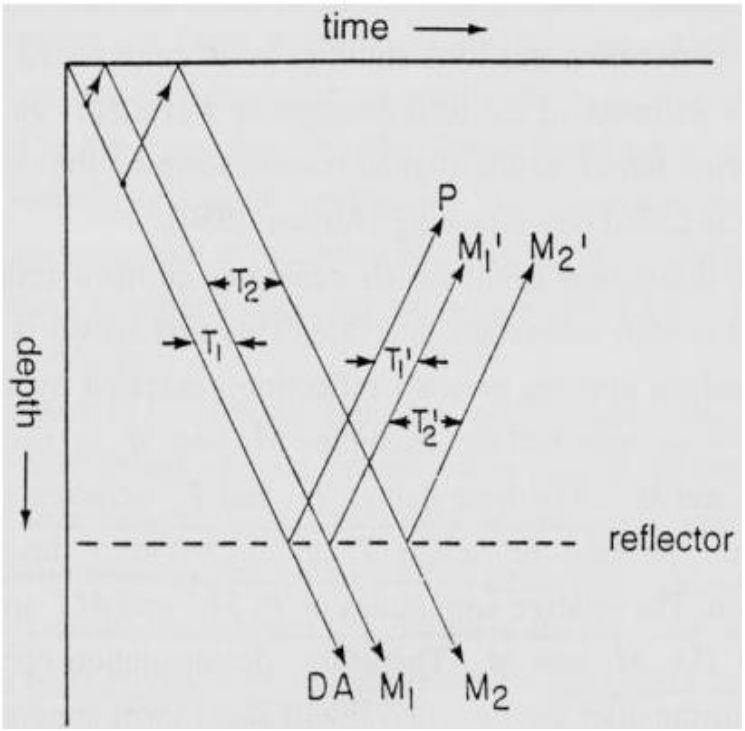

Figure 2, The lag between primaries and multiples is the same in both DG and UG

Examples

This techniques has been used for a seismic data from middle east. First, mutiples were identifed in the VSP data (Figure 3) and then, the predictive decovolution operators were applied on the processed seismic data. That furthure suppressed the residual multiples and as a result of that we can obtain a better correlation in between the VSP corridor and the surface seismic data (Figure 4).

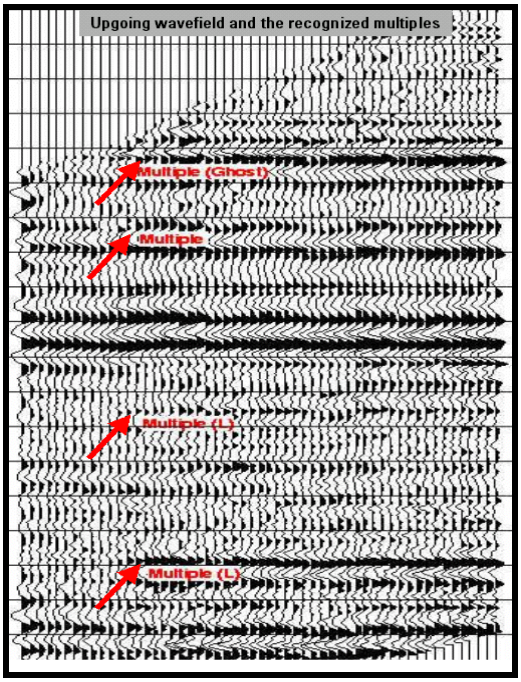

Figure 3, Multiples highlighted in UG

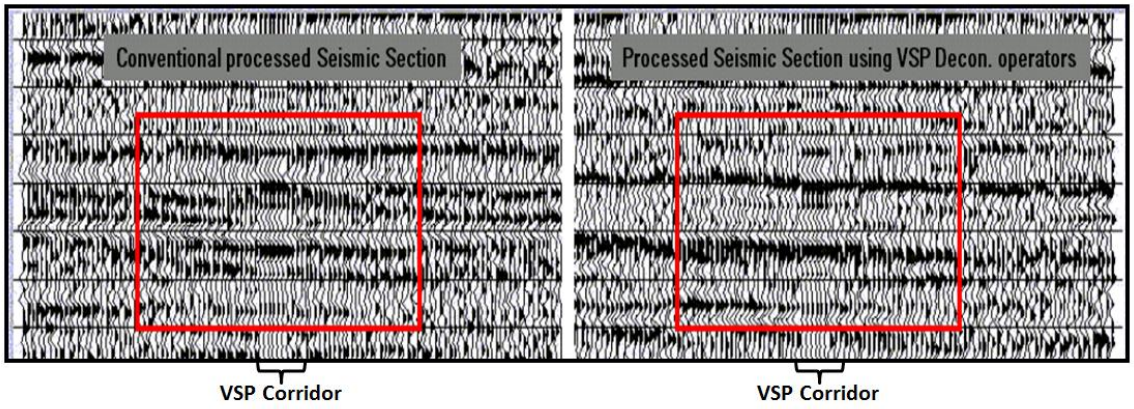

Figure 4, Conventional (left) vs. VSP utilized processed Seismic Section (right)

Conclusions

A VSP data can provide a good understadning of multiples' pattern. This can be furthure used in surface seismic processing to supress the multiples. In this work, the predictive deconvolution operatirs from VSP helped to suppress the multiples in surface seismic data.

References

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Yilmaz O., 1994, Seismic Data Processing, Society of Exploration Geophysicists.