A comparison of standard migration with EOM for Hussar data

Thais A. Guirigay, T.A.*, John C. Bancroft and J. Helen Isaac
taguirig@ucalgary.ca

ABSTRACT

Equivalent Offset Migration (EOM) is a method of prestack time migration based on the principles of prestack Kirchhoff migration and its advantages are simpler, faster, flexible and more reliable than the conventional methods.

Common Scatter gathers are created for each output migrated trace based on the EOM method.

The gathers have high fold and offsets that can be greater than the maximum source-receiver offset. This high fold and large offsets provides a better focus of the semblance plot, and therefore improves the resolution of velocity analysis over conventional common midpoint gathers.

The estimated velocity is RMS type, independent of dip. After velocity analysis, normal moveout and stacking completes the prestack migration.

Prestack time migration requires an accurate velocity model for get a good image of the subsurface.

This study provides a comparison between a standard poststack time migration and prestack time migration with Equivalent Offset Migration for a data set from Hussar area in Alberta.

DISCUSSION

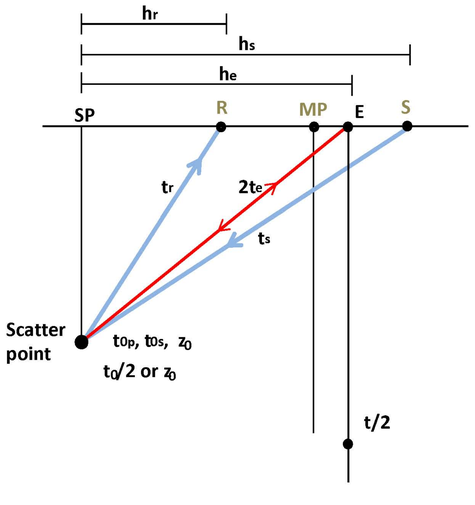

FIG. 1.The raypaths and travel times for a scatter or conversion point. Equivalent offset h_e is defined as the offset from the surface to a collocated source-receiver having h_e same traveltime as the original source-receiver.

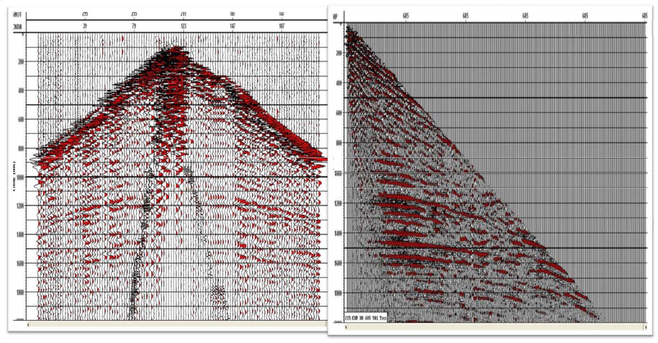

FIG. 2. Two-side CMP gather at 451 (left), One side CSP gather at 451 (right)

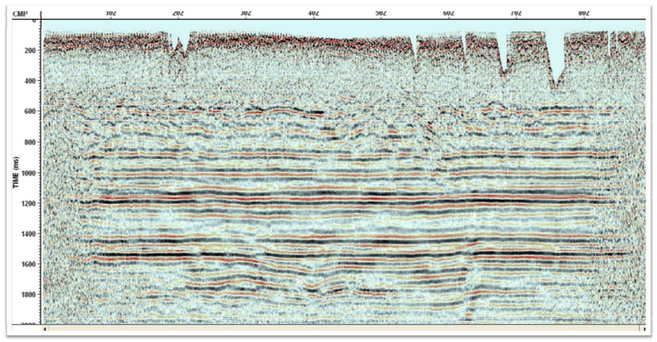

FIG. 3. Final stacked section of Hussar area

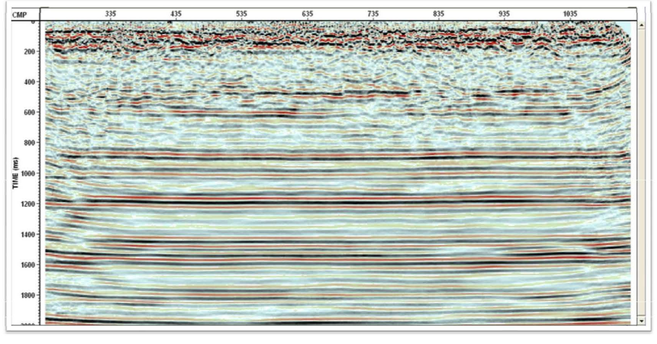

FIG. 4. EOM stacked.

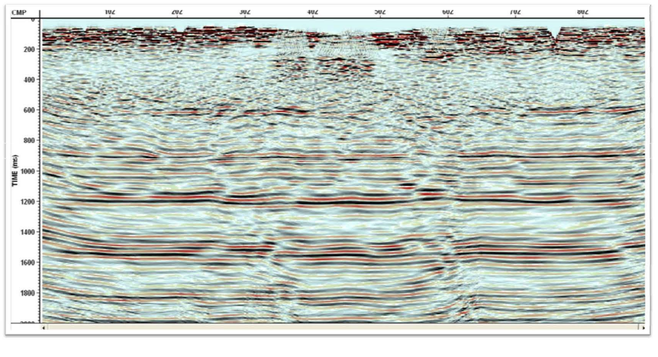

FIG. 5. Kirchhoff PSTM

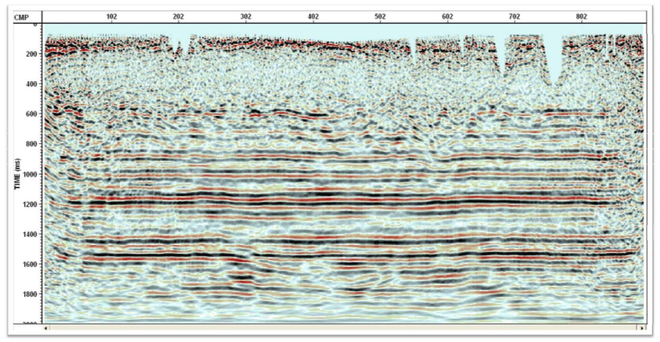

FIG. 6. Finite Difference poststack Migration

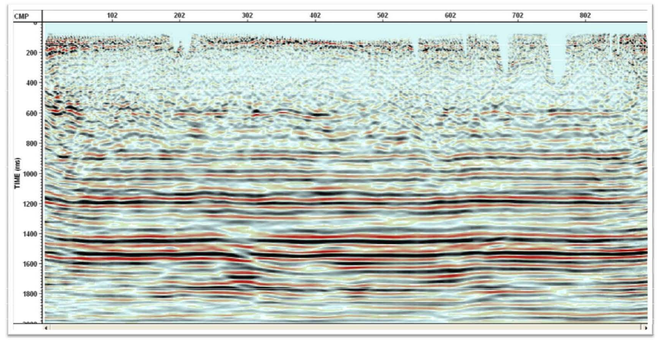

FIG. 7. Kirchhoff poststack Migration

CONCLUSION

EOM is a method of prestack migration based on the principle of Kirchhoff time migration. This method is simpler, faster, flexible, and more reliable than conventional methods.

EOM uses an equivalent offset to form CSP gathers. Standard processing of the CSP gather with NMO and stacking completes the prestack migration process.

The CSP gathers have high fold and longer offset than CMP gathers at the same location which allow an improvement of the velocity resolution.

Comparison between EOM and PSTM Kirchhoff show that EOM have improved coherence and interpretability.

ACKNOWLEDGEMENTS

The authors would like to thanks GEDCO for the use of the software VISTA 2D/3D and LANDMARK for the use of the software ProMAX to process the data. Thanks also to Husky Energy, GeoKinetics, and Inova for collaboration in the acquisition of Hussar data experiment and all CREWES sponsor and staff for their useful support.