# DOUBLE PLANE WAVE DEPTH MIGRATION

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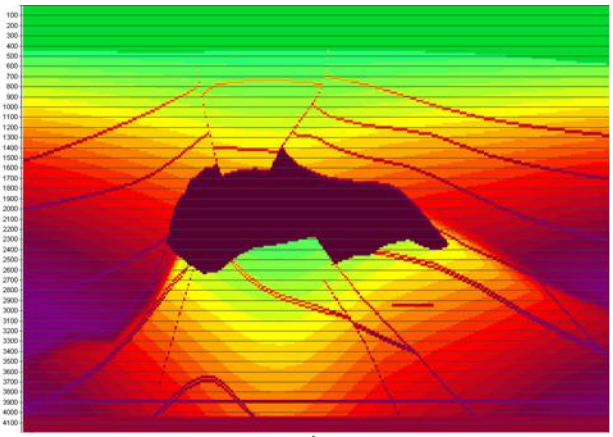
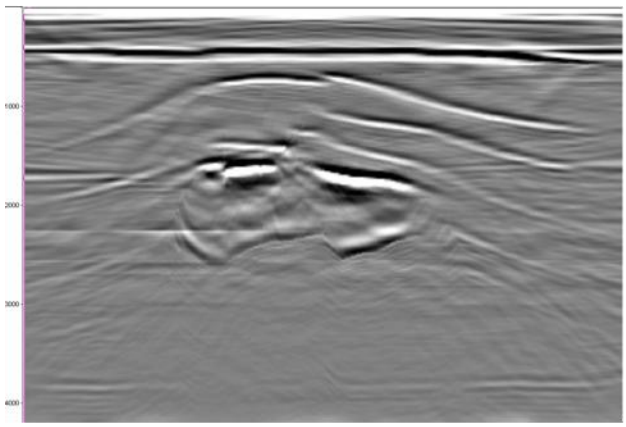
## ABSTRACT

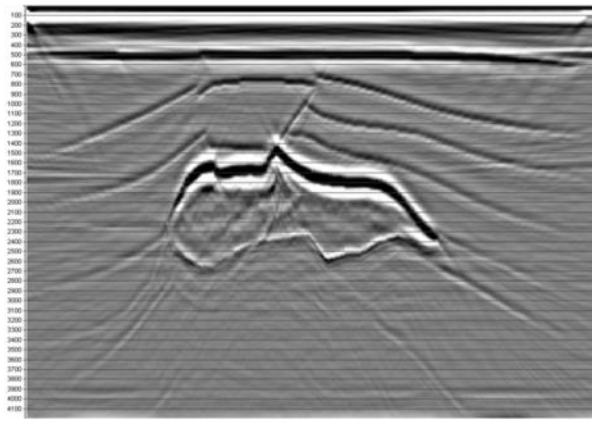
The double plane wave depth migration was introduced by Stoffa and Sen et al. (2006). The method is quite suitable for the densely sampled seismic acquisition system whose size of the data volume is tremendous. Typically used Kirchhoff migration uses each shot and receiver position to do the wavefield extrapolation, which will greatly increase the calculation time when the dataset is large. Nevertheless, by transforming the dataset form the t-x (traveltime-offset) domain to the tau-p (vertical delay time-ray parameter) domain, we can shrink the number of traces needed to be migrated with enough horizontal and vertical resolution. As a type of Kirchhoff migration, the double plane wave depth migration needs to calculate the traveltime tables of plane wave components, however, the amount of traveltime tables of plane wave components needed to calculate is far less than those of the typical Kirchhoff migration. And we can even use the same traveltime table for both the source and receiver plane wave components which have same incident angle at the surface. Besides that, we can also select a range of plane wave components that we want to use in the migration according to the pre-geological knowledge of the subsurface condition, which would further reduce the calculation time. The method will be illustrated by introducing the double slant stacking which transforms the data from the t-x domain to the source and receiver plane wave domain, then the migration method will be derived by using Kirchhoff-integral. I will demonstrate that the double plane wave depth migration enjoys the high efficiency as well as accuracy, the method has great potential to be used into the migration velocity analysis process and it is easy to incorporate the anisotropic effect.



a)



b)



c)

**SEG/EAGE salt velocity model is shown in a) which has 675*210 grid points. Both horizontal and vertical interval is 0.02km. Shot gathers, which has 240 maximum receivers simulating the marine acquisition process from left to right, were obtained and used for double slant stacking and then double plane wave migration. Plot b) shows the image of migrating 121 receiver plane waves and 21 source plane waves which are mainly horizontal plane wave components. Most horizontal structure can be imaged. Plot c) shows how the image looks like by migrating 121 receiver plane waves and 121 source plane waves.**