



Constructing the accurate velocity model by inversing the first break of OBS with the long offset – taking Bohai line as an example

Jun Pan (1,2)

(1) Qingdao Institute of Marine Geology, Ministry of Land and Resources, Qingdao, China, (2) Function Laboratory for Marine Mineral Resource Geology and Exploration, Qingdao National Laboratory for Marine Science and Technology, Qingdao, China

The accurate velocity model was important for deep seismic imaging in complex geological structure area such as the Bohai Bay Basin located in east of China. The velocity model was always built by picking the velocity curve in semblance for multi-channel seismic data processing, but it was hard to get the accurate velocity model especially for deep geological structure. In this paper, we inversed the velocity model using the long offset first break which traveled through the deep geological structure. The key point of this method was the correct picking of the first break in OBS gathers, because the time drift and space alias existed during the acquisition and the OBS data had always been disturbed by low S/N ratio in shallow water environment. We used direct wave correction, forward modeling correction and ray trace reciprocal to pick the first break of the OBS. These methods could guarantee the accurate of the picks and also were useful for quality control. The direct wave correction could remove the main clock drift. We used the accurate shallow velocity model of the multi-channel seismic to construct the OBS gather by forward modeling to make up the space alias of the actual OBS gather. This method could remove the residual clock drift and solve the problem of the first break picking caused by the space alias for the near offset. The ray trace reciprocal method could control the first break picking for the low S/N ratio event with large offset by sorting the OBS gather to different groups with the same offset range. The three steps could solve the problem of the first break picking of OBS gather in shallow water environment with low S/N ratio and it laid the foundation to achieve the accurate velocity model. The results showed that the inversed velocity model was in accordance with the seismic section and it was better than that of multichannel seismic. The method could provide a new way to construct the velocity model of deep complex geological structure in Bohai area.