Efficiency of high-frequency seismic survey on the Black Sea shelf in the processing of seismic data

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The high-frequency seismic survey (HFS) – a seismic method in which the refraction and reflected waves with frequency range from 70-80 to 300 Hz are used. The necessity of HFS is determined by the seismic research objectives of the thin-layer media, which are specified for the Black Sea areas, and the necessity of mapping of low-amplitude complicatedly constructed objects, searching of nonstructural hydrocarbon traps.

The actuality of HFS is to increase the geological efficiency and economic reasonability of exploratory processes. It has higher resolution (the ability separately registration all impulses quickly moving one after another) than the mid- frequency seismic. Data of HFS compared with data of other technologies allow us a more detailed decription of the wave field and more correct geological interpretation.

The main attention was paid to more profound processing of 2D seismic data, on the north-west shelf of the Black Sea with the aim of increasing the informativity and detail of the upper part of the time section.

Was completed the optimal processing graph of high frequency marine seismic data in the Focus program complex. The efficiency of the main single and multi channel data processing procedures was estimated via testing, were chosen the adequate parameters of their using (gain control, attenuation of mid- and low velocity noise waves, muting).

The minimal-phase predictive deconvolution (DECONA) was applied to primary seismic records for improving vertical resolution of the wave field. The surface waves on the seismic records and regular noises are cinematically similar to the waves of initial guess, were significantly attenuated using the tapered dynamic filter (TMDDF). TMDDF applied to primary seismic records, has attenuated the low velocity noises, and has improved the correlation of horizons (for further the velocity analyses and migration).The FKFILT program, which performs F-K filtration, was used in the reduction of regular noise in the wide frequency range. With the aim of multiple reflections attenuation the program ZMULT was used. The post stack 2D time finite-difference migration was applied to time sections in Omega-X domain on the final stage of processing.

We can make the conclusion that while HFS the record of field observations should held with a sampling interval of 1ms. Therefore, interpretational potential of all types of spectral analysis of wave fields significantly increases with the expanding of the frequency band.

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