P2-2 DATA PROCESSING OF THE DEEP REFLECTION SEISMIC PROFILES IN SOUTH BULGARIA

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Two regional crooked deep seismic reflection profiles in South Bulgaria were shot in recent years. The first one (ER1) is crossing the East Rhodope Mountains for crust structure investigation. Data acquisition started in 1993 and data processing finished in 1996. The length of the line is about 130 km.

The second line (SR1) data acquisition started in 1997 as a part of a scientific program for clarifying the geological preconditions for oil and gas prospecting in the Central Sredna Gora tectonic zone as well as crust structure investigation. The beginning of the line is situated in the Thracian lowland south east of the town of Stara Zagora. Then the line crosses the Sredna Gora mountains and ends at the crest of the Balkan mountains. The length of the profile SR1 is about 50 km along the existing roads. The topographic relief is changing from about 120 up to 650 m in south-north direction. Data acquisition is carried out in December 1997 and data processing is finished in April 1999.

Seismic reflection lines are recorded using a 240-channel system MDS-16 operating at 4 ms sample rate and 16 s record length. A split spread and geophone array spacing at 50 m are used. Four 13-ton Vibroseis trucks are operating at 100 m intervals yielding nominal 60-fold data. The uphole method to study the weathering low-velocity zone is applied.

The main processing problems is enhancement of the S/N ratio on the field records and on the seismic sections; reducing the destructive influence on the stacking of reflections dips across the crooked lines: calculating the residual static corrections. The low resolution of the velocity analyses resolution and the existing conflict dipping reflectors are additional difficulties.

During the East Rhodope's profile data processing the pre-stack time-variant spectral whitening, adaptive and KLT filtering and alternate types stacking procedures have been tested for the enhancement of the S/N ratio. Different kinds of velocity analyse, residual static corrections and pre-stack and post-stack migrations were tested too.

The processing sequence of the new seismic data (line SR1) is realized on the basis of our experience in the processing of the first regional deep seismic profile ER1.

ProMAX software based on a RISC 6000 system is used for data processing.
2D Crooked line geometry method is applied. The geometry of the field spreads is used to compute and display the scatter map of all CMP's and to select the average CMP line. The seismic section is obtained by stacking in a single 800 m wide strip including near 90% of total CMP's.

The pre-stack lag surface-consistent deconvolution and time-variant whitening gives good results for the enhancement of the S/N ratio.

The residual static correction is a very important procedure for this line, where bedrock velocities are changed from 2000 m/s in the south part up to 4000 m/s in the middle and in the north parts of the profile, and the difference between datum level (+150 m) and geophone level is up to 500 m. The Maximum Power surface consistent autostatics program is very effective in poor signal-to-noise data. After all efforts to obtain the optimum statics and velocity solutions are made, a final pass of non surface-consistent CMP trim statics is applied to optimize trace alignments within a CMP gather. The comparison of the sections without and with applying the residual static corrections shows the determinative role of this procedure for improving the quality of the data.

The resolution of the velocity analysis is low and the stacking quality for deep reflections varies weakly in the case of large-scale velocity changing. Kirchoff post-stack time migration and depth conversion as well as post stack depth migrations are tested by summarised interval and average velocities.

The results from the data processing helped for obtaining new valuable information about the volcanic and sedimentary complexes and the crust structure in the South Bulgaria.