Application of the field seismic data in superficial structure study for Wenshui Area

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The Wenshui area is located in middle-west of Shanxi Province in north China, where plenty of coal resources are mined. In recent years, a large amount of seismic exploration work with the aim at coal recources has been done in the area successively. Based on the foundation of seismic exploration data, this study focuses on the superficial structure of sedimentary basin in the Wenshui area.

A 3D seismic data acquisition had been done in the Wenshui area. Seismic exploration lines are little longer than the field survey profile to cover all the possible coal resources area. In order to obtain the superficial structure of the area, seismic data processing had been done. And it can be summarized concisely into the following steps [1]: (1) carefully checked the positions of field shot-receiver pairs to obtain accurate localities; (2) calculated the static corrections in details; (3) eliminated bad shots, bad courses and abnormal amplitudes; (4) selected appropriate deconvolution parameters; (5) made accurate velocity analysis and got residual static corrections through stacking; (6) carried out the post stack processing and precise migration.

The result shows that there is a large syncline structure in the centre of the region, suggesting long-term tectonic push influenced Wenshui area since Triassic. This crustal deformation was accompanied with rock cracking in both coal sills and their wall rocks, which could lead to potential danger to the deep exploitation for coal mines.

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[1] Zhang Z. J., *et al* (2004), *Chinese J . Geophys*. (in Chinese), 469-474.

Silicon isotope composition of chert in carbonate rocks, as an indicator of paleo-environmental variation in ocean

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An investigation on the silicon isotope variation of chert bands and nodules in carbonate sedimentary formation from early Proterozoic to Mesozoic is undertaken in this study to study the temporal variation of the environmental conditions of the ocean.

The cherts in carbonate formation of Proterozoic period show large variation on their silicon isotope compositions. The δ^{30}Si values of chert from early Proterozoic Futuo Group vary from 0.1‰ to 1.3‰, with an average of 0.76‰, whilst those from middle Proterozoic Changcheng Group vary from 1.1‰ to 3.4‰, with an average of 2.09‰. The chert from late Proterozoic strata has lowest δ^{30}Si values, varying from 0.0‰ to 0.9‰ and with an average of 0.36‰.

The cherts in carbonate formation of Palaeozoic and Mesozoic periods show smaller δ^{30}Si variation than for Proterozoic. The chert of early Palaeozoic shows δ^{30}Si values from -0.6‰ to 1.7‰, averaging 0.70‰. Similarly, the chert of late Palaeozoic shows δ^{30}Si values from -0.4‰ to 1.7‰, averaging 0.61‰. Furthermore, the chert of Mesozoic shows δ^{30}Si between -0.3‰ and 1.1‰, averaging 0.55‰.

The positive δ^{30}Si values observed in all cherts in the carbonate formation from Proterozoic to Mesozoic indicate that the ocean has positive δ^{30}Si value since early Proterozoic period. This may be caused by the increase of biological activities, which generate silicon isotope fractionation while reduce the silicon content in the ocean water. The higher and more variable silicon isotope compositions of Proterozoic chert may reflect the significant change of environment conditions (temperature and Si content) in ocean from Archean to Proterozoic.