Geophysical Research Abstracts,
Vol. 11, EGU2009-23-2, 2009
EGU General Assembly 2009

3D seismic imaging, example of 3D area in the middle of Banat

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3D seismic imaging was carried out in the 3D seismic volume situated in the middle of Banat region in Serbia. The 3D area is about 300 km square. The aim of 3D investigation was defining geology structures and techtonics especially in Mesozoik complex. The investigation objects are located in depth from 2000 to 3000 m. There are number of wells in this area but they are not enough deep to help in the interpretation. It was necessary to get better seismic image in deeper area. Acquisition parameters were satisfactory (good quality of input parameters, length of input data was 5 s, fold was up to 4000 %) and preprocessed data was satisfied. GeoDepth is an integrated system for 3D velocity model building and for 3D seismic imaging. Input data for 3D seismic imaging consist of preprocessing data sorted to CMP gathers and RMS stacking velocity functions. Other type of input data are geological information derived from well data, time migrated images and time migrated maps.

Workflow for this job was: loading and quality control the input data (CMP gathers and velocity), creating initial RMS Velocity Volume, PSTM, updating the RMS Velocity Volume, PSTM, building the Initial Interval Velocity Model, PSDM, updating the Interval Velocity Model, PSDM.

In the first stage the attempt is to derive initial velocity model as simple as possible as.The higher frequency velocity changes are obtained in the updating stage. The next step, after running PSTM, is the time to depth conversion. After the model is built, we generate a 3D interval velocity volume and run 3D pre-stack depth migration. The main method for updating velocities is 3D tomography.

The criteria used in velocity model determination are based on the flatness of pre-stack migrated gathers or the quality of the stacked image.

The standard processing ended with poststack 3D time migration. Prestack depth migration is one of the powerful tool available to the interpretator to develop an accurate velocity model and get good seismic image.

A comparison of a time and depth migrated sections highlights the improvements in imaging quality. On depth migrated section imaging and fault resolution is improved and is easer to get more complex and realistic geological model.