AAPG HEDBERG CONFERENCE
"Paleozoic and Triassic Petroleum Systems in North Africa"
February 18-20, 2003, Algiers, Algeria

3D SEISMIC ATTIBUTES AND GEOSTATISTICAL TECHNIQUES DESIGNED TO ENHANCE INTERPRETATION
An experience in the Illizi Basin

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The seismic signal contains much information about the subsurface that is not immediately apparent from conventional seismic displays. This is especially true for the complex trace seismic attributes, and its possible relationships with petrophysical parameters.

From a recent 3D seismic survey, which covers the TinFouyé Tabankort gas and oil field in the Illizi Basin, a preliminary geophysical study has been accomplished, involving geological and seismic data.

A Schlumberger Geoquest software package (comprising seismic, petrophysics and geostatistics) was used to reach the results.

Several goals were stated: Updating of structural maps on the area, analysis of seismic facies, relationship between petrophysical properties and seismic attributes, map generation of petrophysical parameters and fracture network.

In order to fulfil these aims, the job was split into two phases:

First stage includes the seismic interpretation of the Top Ordovician reservoir. A depth conversion which implies well velocities yields to a Depth Map of the top of the reservoir.

Second stage consists of a detailed study of the reservoir, based on a stratigraphic interpretation of seismic attributes. A classification of the different workflows can be made:

- Analysis of subtle structural events related with fractures by using *grid based attributes* and its correlation with fracturation and production data extracted from wells.
- Study of the inner structure of the reservoir based on the analysis of seismic attributes derived from amplitude, frequency and phase calculated along the Top Ordovician horizon (*surface based attributes*) or calculated from a time window that corresponds to the reservoir (*volume based, VRS attributes* and *Variance Cube*).
- A classification of seismic facies (integration of several seismic attributes) was performed by using the SEISCLASS software, with the aim of establish a qualitative relationship between actual well data and seismic data.
- Both petrophysical parameters (calibrated by wells) and confidence maps were obtained from the seismic attributes. LPM (Log Property Mapping) was the Geoquest module used for this task.

It is important to indicate that the reliability of all outputs is highly dependent on the quality of the seismic data, which in the present case is fair to good, and on the quality of the reservoir, 6-7 % porosity.
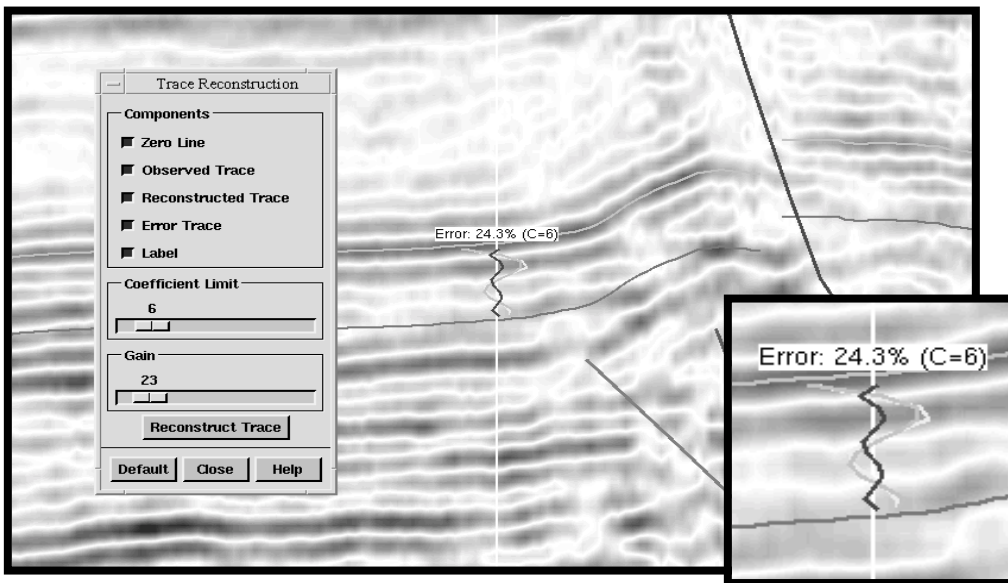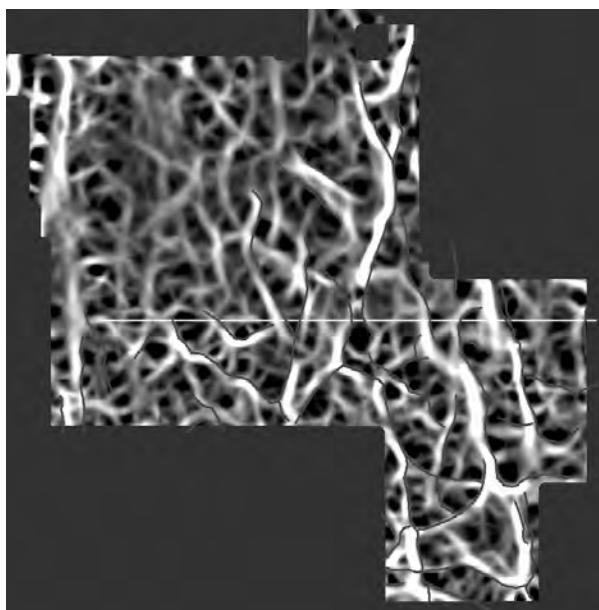

Fig. 1:   VRS TRACE RECONSTRUCTION

Fig. 2: CURVATURE ATTRIBUTE OF TOP RESERVOIR TIME MAP