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USING OF NEW GEOPHYSICAL METHODS FOR EXPLORATION OIL AND GAS TRAPS IN THE NEOGENIC TERRIGENOUS DEPOSITS IN THE PERIADRIATIC DEPRESSION

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ABSTRACT

Periadriatic depression extends in Northern part of Ionian orogene and western part of the Kruja orogene (Fig. 1). In this area are discovered a several oil and gas traps in the Neogenic terrigenous deposits. Oil traps are deiscovered in the Messinian deposits while gas traps are evidenced mainly in the Pliocen deposits. From the stratigraphical point of view, oil field includes the Messinian deposits that are unconformably with carbonate deposits (Fig. 2).

The PAD includes deposits from Serevalian to Quaternian ages. In this region are drilled many wells that have penetrated both terrigenous and carbonate deposits.

During last years in this area new methods for calculation of oil and gas bearing and prognozed thicknesses of oil and gas traps are med.

KEY WORDS: From the stratigraphical poin of view, Unconformable with carbonate deposits. The complex trace analysis, Detection of the hydrocarbon accumulations.

1. INTRODUCTION

Based on the geological, seismical, wells log and wells section data the different oil and gas traps are drawn.

By, using the complex trace analysis, we have determined the amplitude and phone in the time sections which are very important in the detection of the hydrocarbon accumulations.

The biggest oilfield discovered in Messinian deposits in Albanian territory is Marineza area (Fig. 3).

From the stratigraphycal point of view the oil pools of this field are encountered in Messinian deposits.

Marineza oilfield is located in the northern eastern part of the Fieri city (Fig. 1) Marineza, Drí/a and Gorani suites are the main oil producting ones. The thicknesses of these suites are 170, 120 and 100m respectived. The well log data show that the sections of these suites consist of sandstone beds with silty and shale beds.

The morfology of the Neogene deposits is very complex. Geophysical, geological and wells data indicate that the burial depth varies from 1000 to 2500m.

Since the Lower Miocene the Peri-Adriatic depression represents a part of an active submerging basin.

2. REGIONAL TECTONICS

From the tectonic point of view the Marineza oilfield lies unconformably with eroded limestone structure of Patos-Verbasi (Fig.2). The drilling of main wells in eastern part of this region, is mainly based on the sedimentological studies drawing the unconformity distribution, very detailed geological and cross sections as well as on the data of production wells. The Neogene deposists in this region are not folded wheras western tectonic fault of this structure does not intersect these deposits. The Messinian deposits (including the suites) towards north are thicker whereas the thicknesses of the Burdigalian and flysch

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deposits are reduced (Fig. 1). These changes are result of the movements of the structural plane, dip towards the north for Messinian deposits and towards the south for older deposits (Fig. 2). These changes of the structural plane are caused as result of the action of Apulia and Paxos underlied zones according to the respectively tectonic phases.

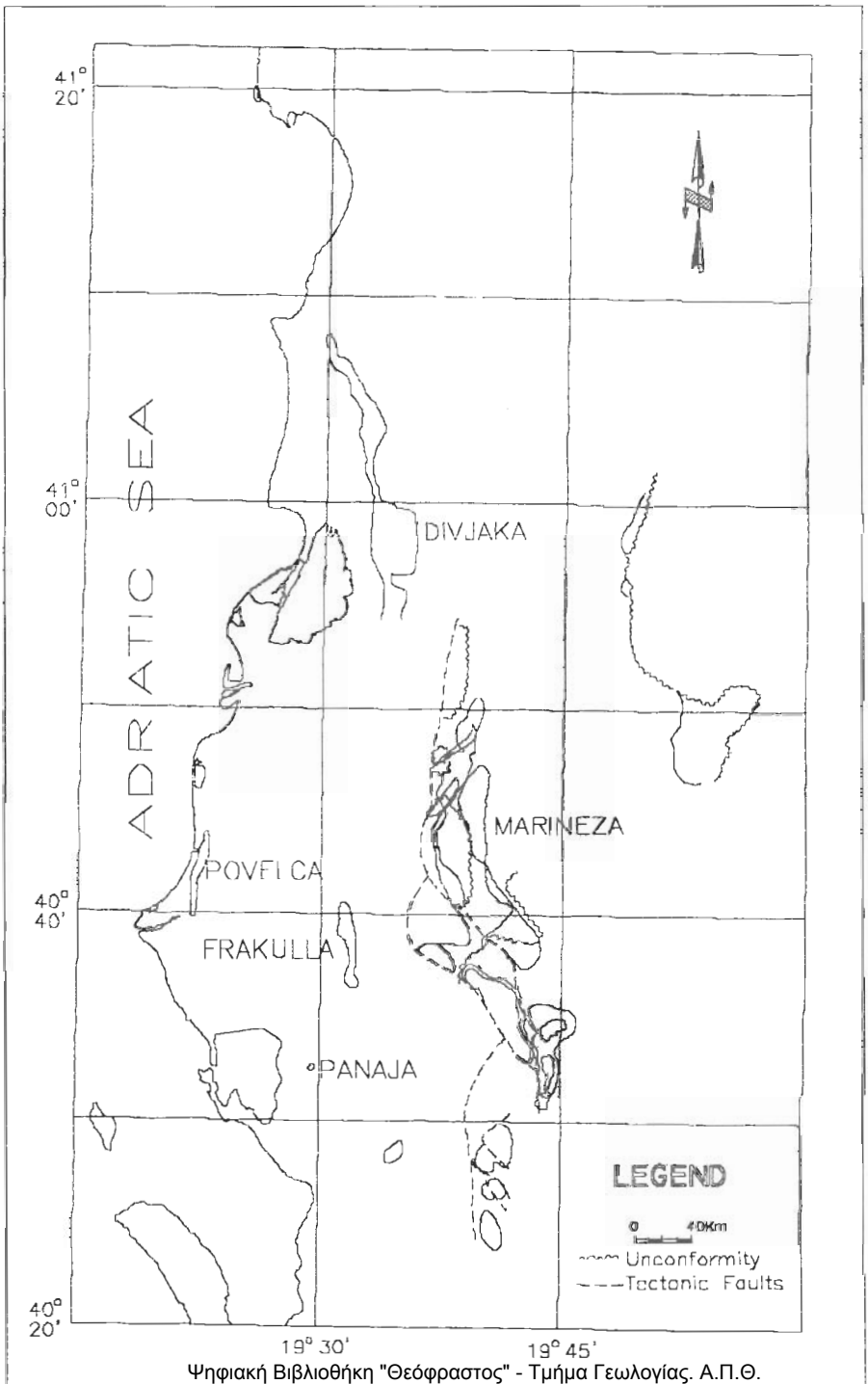

Fig. 1: Location of Studied Region

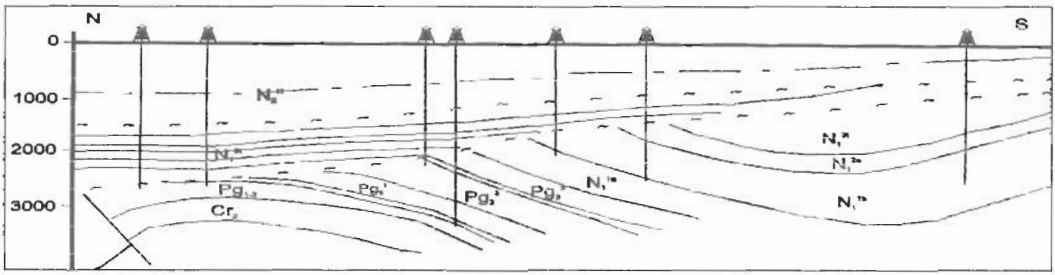

Fig. 2: Geological longitudinal section in Marineza Oil field.

These tectonic phases, during and post- Pliocene, have caused fractures and minor faults within the carbonate structure of Patos-Verbas. In the western part of the structure, faults and unconformity have served as possible migration paths of oil from limestone towards the Messinian deposits whereas in eastern part only the unconformity.

3. USING OF THE NEW SEISMIC METHODS

The developments of technology require urgently to grasp the detailed and the geological information in the studied region. The gas bearing structures as Divjaka, Frakulla are the "Flower" structures at the Pliocene age. They are deiscovered mainly by means of the sedimentological studies, well sections and the detailed interpretation of seismic lines on the bases of our experience in eastern part of Marineza oilfiled. It is concluded that the sharp high reflection are associated neither distinguished lithological changes or with gas accumulations. During the seismic interpretations the determination of the instantaneous plane and frequence are very important to solute the above questions. The low frequence shadows may be associatd with reflections. The seismic data interpreted in integration with the well logs have did possible the drawing of the seismic facies distribution and the structural maps (Fig.3).

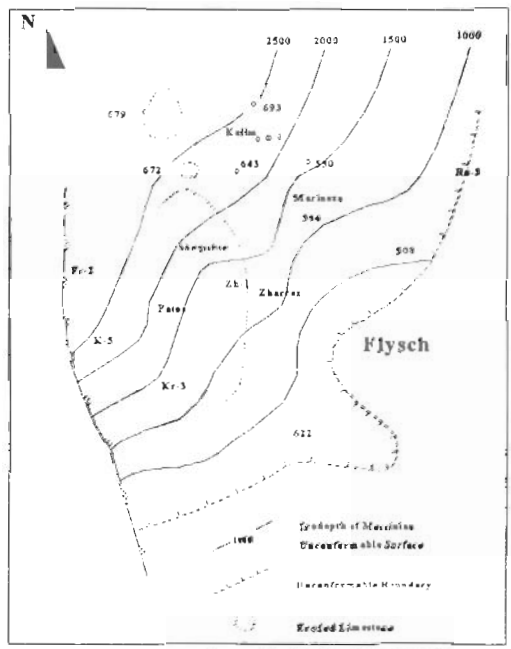

Fig. 3: Map of Unconformably Surface by Messinian Deposits in Patos Marineza Region

The distribution of minor-faults with throws about 5m among them is very important. At present, recognizing minor-faults using seismic waves characteristies parameters extracted from the high quality data acquired using 2D and 3D high resolution seismic exploration is one of the most hopeful method (Liu Tiang Fang & Zhao Aiuha, 1997). Although they have resulted in satisfactory geological effect in some areas, sometimes both need to set up two styles of standard patterns, fault pattern and normal pattern. However, it is not always easy and not possible at all certain cases. We can also apply seismic characteristic parameters directly to detect the minor-faults, on conditions that the total anomalies resulted from the faults are always large than the total not only are independent or less correlative with each other but the anomalies do relate with the faults. On the base of this point of view, we give a new method to detect minor-faults only using seismic characteristic parameters. Also, in the seismic interpretation are used seismic amplitudes for lithology discrimination within a three-component system and relation between horizons and sequence boundaries for a programming sequence (Liu Tiang Fang & Zhao Aiuha, 1997).

Let's suppose that x is the set of seismic traces to be recognized and is expressed as :

$\{x_1, x_2, \ldots\ldots\ldots x_m\}$ where **m** is the number of the traces. If each trace within the set consists of n characteristic parameters than we can rewrite the set **X** as following matrix:

$$X = \begin{bmatrix} X_{11}, & X_{12} \cdots\cdots X_{ij} \cdots\cdots X_{1n} \\ X_{il} & X_{i2} \cdots\cdots X_{ij} \cdots\cdots X_{in} \\ \vdots & \vdots \quad\quad \vdots \quad\quad \vdots \\ \vdots & \vdots \quad\quad \vdots \quad\quad \vdots \\ X_{ml} & X_{m2} \cdots\cdots X_{mj} \cdots\cdots X_{mn} \end{bmatrix}$$

where **{i=1,2,..... m; j=1,2,.....n}.**

This method recognizing minor-fault mentioned above is not only effectual and simple but keeping away from the troubles of setting up standard patterns. Moreover, it can be used other similar problems as well.

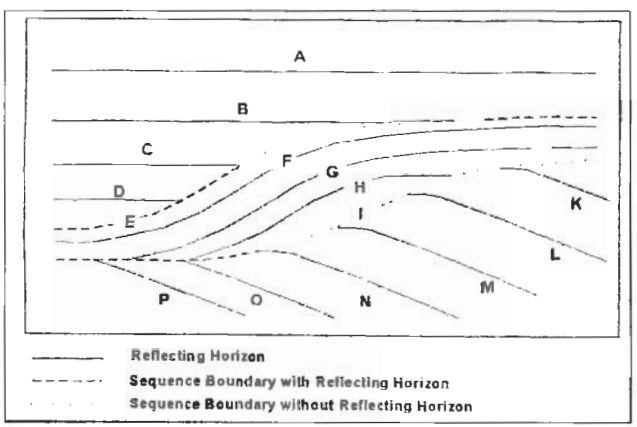

Fig. 4: Schematic Seismic Section Showing Relation Between Reflecting and Sequence Boundaries for a Prograding Sequence

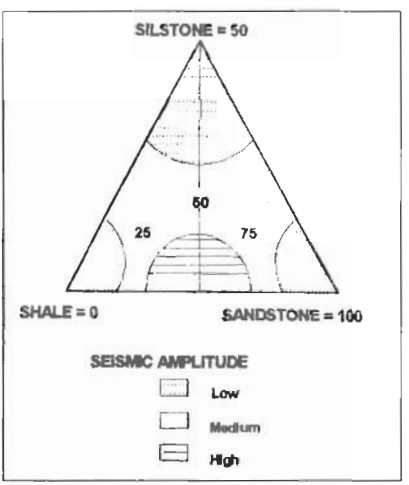

Fig. 5: Use of Seismic Amplitudes for Lithology Discriminaton Within a Three-Component System

Another methods is AVO program which helps interpreting geophysicists to estimate the lithology and fluid content of reservoir rocks using the technique of amplitude versus offset analyses(AVO). The program includes several tools to perform this analyze, ranging from gradient/intersect stacks through modeling to full inversion.

Before performing detailed quantitative AVO analyses, we want to qualify any potential anomalies. This can be done using the option in the AVO processing window, which includes:

Displaying input gathers in wiggle trace format, colors variable, density format or using instantaneous attributes such phase and frequency.

Range limited stack, in which the seismic data are stacked aver three offset or angle rangers and displayed in three separate views within a window. Again, these views can be displayed wiggle trace color amplitude, or instantaneous attribute from.

Gradient and intercept displays, based on Shuey's well known equation : $\mathbf{R}(\theta) = \mathbf{P} + \mathbf{G}\sin^2\theta$ in which the data are separated into intercept (P) and gradient (G) attributes. These attributes can be displayed alone or in various combinations.

Event picking and analysis, in which target and reference events are picked and displayed. The target event can be improved by dividing it by deference event, there by minimizing processing and acquisition problems.

4. AVO MODELING

Once the logs have been input and edited, an AVO synthetic can be created by ray-tracing to each layer and performing the full computation of the amplitudes.

A quantitative way of performing this update is to use one of AVO's inversion options. AVO inversion involves changing the model to minimize the difference between the observed seismic data and synthetic data. The inversion can be performed using any window of the data and any combination of physical parameters.

Based on the AVO attributes the seismic interface belongs to it has a low value of the zero-offset reflection coefficient it shows an increasing AVO response, and its angle of crossover is zero or low value.

5. CONCLUSIONS

The Peri-Adriatic depression represents the different oil and gas traps in the Messinian and the Pliocene deposits.

The oil-bearing sandstone beds of Marineza suite in the northern-eastern part of the Marineza oil field show high pressure during exploration. These beds do not communicate with the western part because in this area the lithological changes are present.

Along the eastern part of the oil field there is a possibility of finding of microbays because the erosional valley is not uniform.

The oil saturation of the Kuçova suite in this area is conditioned by the changes of the reservoir properties.

The Messinian deposits represent a structural stage and no any tectonic phase.

These Messinian deposits in the Patos-Verbas structure are neither folded nor intersected by means of any fault.

In the future, the detection of minor-faults and new oil and gas traps within the Neogenic terrigenous section, oil field, requires using of 2D and 3D high resolution seismic exploration.

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