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THE STRUCTURAL MODEL AND TECTONIC STYLE OF THE CARBONATE STRUCTURES IN THE IONIAN ZONE DEDUCED FROM THE INTERPRETATION OF SEISMIC DATA

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ABSTRACT

The region in the study extends in the south of the external Albanides in the Ionian Zone. The multichannel seismic data performed in this region have provided considerable information about geological setting. By means of the seismic data the structural moedel of the carbonate structures of the Ionian Zone is deduced. According the these data we concluded that the thrusting from East to West is represented as a common feature of this zone. It is attained to judge and interpret the tectonic thrusts that devide belts inside the Ionian Zone and thrusts of the carbonate structures of the belt itself.

SHORT VIEW ON GEOLOGICAL SETTING AND SEISMOLOGICAL CONDITIONS

The region in the study extends in the south of the external Ablanides in the Ionian Zone (Fig. 1). There are many geological - geophysical studies and drilled wells. In the geological setting, Plio-Quaternary to Cretaceous - Jourassic deposits occur. The transgression phenomenon of various deposits is distinguished on surface, by wells and seismic data. The Pliocene and Tortonian transgression onto older deposits is more typical.

The thrusting tectonic and the dip angles of the structural flanks constitute a great restriction in seismic resolution and make also a difficulty in the seismic acquisition. There is much noise in the time seismic section. The diffraction waves are predominant besides others and in some cases the multiples from strong reflectors are present as well (Fig. 2a, 2b). However the eastern flanks of carbonate structures are generally represented as favorable for the seismic method in this region. The complex geology of this region, as well as the montainous and more accidented terrain, are negative factors in acquiring the quality of seismic data. All these elements of the subsurface and surface condition are taken into consideration for selecting the proper field seismic methodics.

ESTIMATION OF THE ENVIRONMENT PHYSICAL PARAMETERS AND SELECTION OF SEISMIC ACQUISITION FIELD METHODICS

Based on all the data from outcrops, wells, acoustic logs, check shots etc., it has been concluded that terrigene - carbonate boundary is represented by favourable acoustic property (Table 1).

The reflection coefficient of this boundary in comparison to others (inside the terrigene section) is high. It ranges from 0.17 to 0.34. In some parts of the carbonate structures, especially theit top parts, the reflection coefficient

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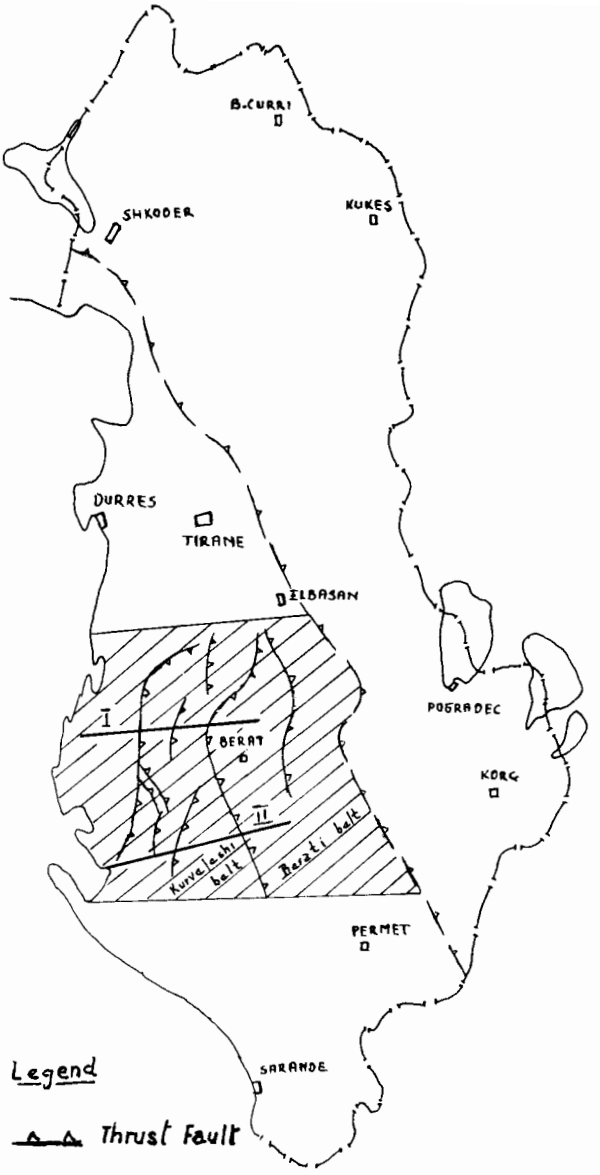

Fig. 1: Location of the region in study.

decreases and seismic reflections from this boundary are poor. This problem is very important because the structure may exist and the seismic response dos not reflect it.

According to many experiments and observations it resulted that fissures, microfissures, small fractures and presence of fluid have a great influence in the seismic response. So in these rocks the physical conditions are more predominant than lithological parameters (Seitaj, 1986). Taking into consideration the geological model of a developed tectonic and some physical parameters (velocity, density etc.), many experiments are carried out to select the methodics of seismic data acquisition. The experiments consisted in increasing of signal - noise ratio.

The optimal parameters of seismic acquisition used in this region have been as follows (Mema, 1989; Stamata, 1990):

Number of channels: 48 to 96
Channel space: 25m and 50m
Average folding: 24 to 48.

During last twelve years, using digital recording, the quality of seismic data is improved and some structures are identified. Neverheless it must be said that there are still more problems to be solved because of the failures in some interpreted carbonate structures.

SEDIMENTATION ENVIRONMENT AND SEISMIC RESPONSE

The carbonate deposits of the Ionian Zone belong to pelagic facies. The top of carbonate is represented by strong reflections with good continuity. The thickness in 300 to 500 milisec from top of the carbonate downwards is rich in seismic reflections which are rearly parallel and continous, especially in eastern flanks (Fig. 2a, 2b; structure "SH"). These characteristics are taken into consideration during the interpretation of seismic section.

STRUCTURAL MODEL AND TECTONIC STYLE

After a long period of seismic and geological exploration in the Ionian Zone, it is attained to acquire the quality of seismic data by which the

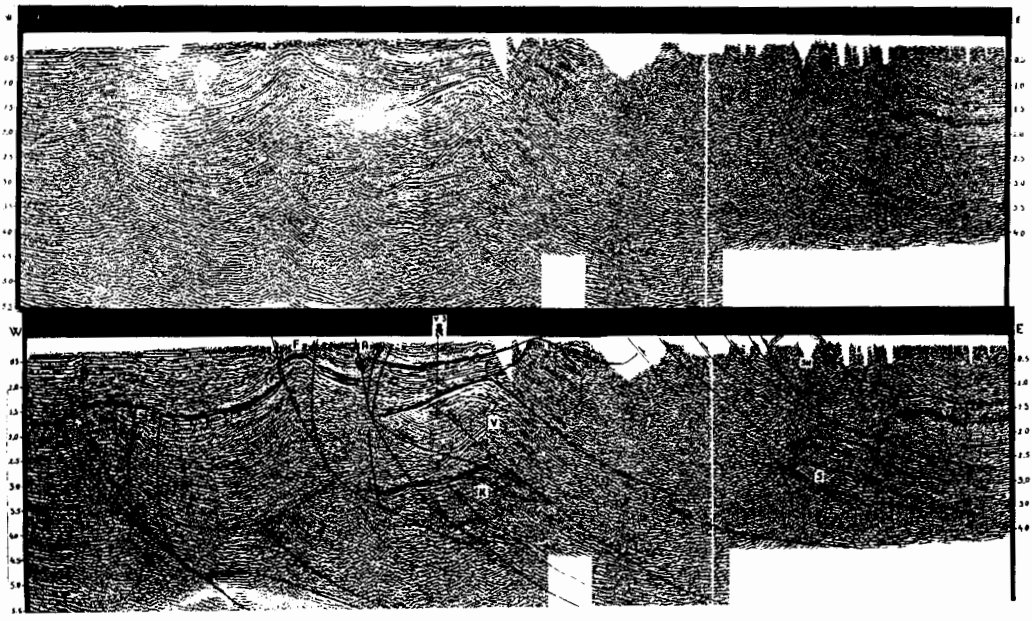

Fig. 2: Seismic line I.

Table 1: Physical parameters

Nr of well	V. carbonat (m/sec)	V. terrigene (m/sec)	p. carbon (g/cm^3)	p. terrigene (g/cm^3)	Reflect. coeffic.
M-1	6450	4000	2.68	2.61	0.24
C-28	6150	3800	2.66	2.62	0.24
B-27	6000	4400	2.64	2.55	0.17
V-3	5.800	3300	2.65	2.25	0.34

structural model and tectonic style is deduced. In order to illustrate these problems we refer to two seismic lines (Fig. 2 and 3). In the first seismic line (Fig. 2) the following are distinguishedQ

- Eastern flank, top of the eroded carbonate structure "V", and western thrust.

The western thrust is also verified by well V-3 (Fig. 2b). In the interval of picket 350 to 3950, under the sructure "V" the carbonate structure "K" is identified. Prior to performance of seismic lines this structure was unacceptable. As we can see in figure 2b, through the seismic line I the structural model and tectonic style are given. The structure "K" is completely burried by thrusting of structure "V", therefore the tectonic style is dublex. These data indicate that the Kurveleshi belt (which they belong to) is more thrusted from East to West for some kilometers.

In front of these structures ("V", "K") some interformational faults are interpreted. By these faults it is reached to explain the tectonic movements during the geological stages and some other geological phenomena ("flower" structures forming "F" and "A").

To the East of structures "K" and "V" of Kurveleshi Belt the structures of Berati Belt are identified as well as the respective structures "SH" and "S". The tectonic style between the two structures is duplex. The seismic data in

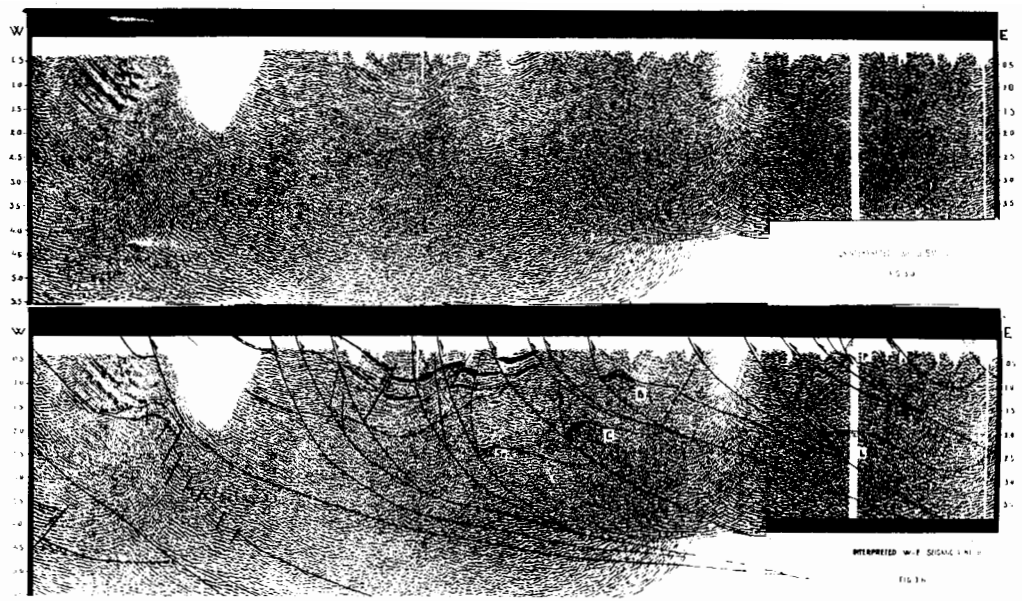

Fig. 3: Seismic line II.

front of these structures is more complicated because of some interformational faults, which are investigated besides seismic data by geological surface data as well (Fig. 2b and 3b). Therefore these structures have thrusted from East to West for some kilometers. The eastern flank of the structure "SH" is fractured by some reverse faults and the seismic data are poor but towards East the seismic data are rich on top and downwards too (Fig. 2a and 2b).

In the second seismic line (Fig. 3a and 3b) it is attained to interpret the carbonate structures "Se", "C" and "B" of Kurveleshi Belt and structures "L" and "M" of Berati Belt. The tectonic in this line is represented more developed and tectonic style is accepted to be imbricated from East to West (Tushaj et al., 1991). There are many interformational thrust faults besides the main thrust faults of carbonate structures. Consequently the seismic display is chaotic in front of them.

The carbonate structures described above are mapped through many seismic lines, the thrust concept was confirmed and some oil fields are discovered in the region. Nevertheless it must be said we have had failures and because of them we have worked to improve seismic data.

CONCLUSIONS

The endeavours to improve the quality of seismic data in this region which more developed tectonic, after many experiments and observations, have been successful. In general the terrigene - carbonate environment in the Ionian Zone is of good acoustic property, and as a result of it the top of carbonate is represented by strong reflections.

There are more seismic reflections with high amplitude and good continuity inside the carbonate section. More typical is the thickness 300 to 500 milisec. from top of carbonate downwards. In front of the thrust, the seismic data of terrigene section is chaotic but in eastern flanks thre are more seismic reflections. By means of the seismic date the structural model fo the carbonate structures of Ionian Zone is provided. It is attained to judge and to interpret

the tectonic thrusts that devide belts inside the belt itself. The duplex and imbricated tectonic style is predominant in the Ionian Zone.

Through the analyses of all seismic data carried out in the Ionian Zone besides the ones mentioned above, it is thrown light on the thrust scale of belts and is explained the geotectonic evolution during geological stages.

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