# Determined active faults significant for the implementation of the Project MARINEGEOHAZARD

# Определени активни разломи, имащи значение за изпълнението на проект MARINEGEOHAZARD

***Orlin Dimitrov, Ivan Genov***
***Орлин Димитров, Иван Генов***

Institute of Oceanology–BAS, 9000 Varna, P.O.B. 152;
E-mail: ovdimitrov@gmail.com, ovdimitrov@io-bas.bg; idgenov@io-bas.bg

**Key words:** Neo-tectonic, seismic-stratigraphy, Moesian plate, Lower-Kamchia drop.

## Introduction

Neo-tectonic research works presented in the report are based on the seismic-stratigraphy. The geological structures studied are located in the south-eastern area of Moesian plate and in the Lower-Kamchia drop. This area is part of the Bulgarian Black sea sector, and is very significant for the implementation of the project “MARINEGEOHAZARD”. This project is under the programme CBC (Cross Border Cooperation). The Quaternary sediments have been the subject of study. The main purpose is to define the active faults that have been essential importance for the seismic-tectonic research.

The materials used here are seismic acoustic profiles gained during expedition of the Institute of Oceanology–BAS, Varna. The seismic waves were of applied electric spark source.

Some literature data have also been used. The method of seismic stratigraphic approach established in the Russian Academy of Science is applied (Gogonenkov, et al., 1987; Nikolaev, 1987; Slesinger, 1998). Some methodological approaches developed in competent institutes in the USA and West Europe have been used (Sherif, Geldart, 1988; Trabant, 1993).

## Results

As a result of geotectonic researches a lot of tectonic disorders were defined (Fig. 1). It was found out that the trajectories of a series of faults pass through the trajectory of the 100 m. isobath. It can be accepted that these faults represented separate segments of a large fault. Looking at the sector around the trajectories of profiles of profiles IX–XIII we can notice that the segments A III, A IV are bended and another fault is fixed between them. The geographic latitude of these curves coincides with the geographic latitude of the uppermost eastern segment of the subparallel fault starting from “Saedinenie” reservoir, across the middle of Varna lake and continuing into the sea.

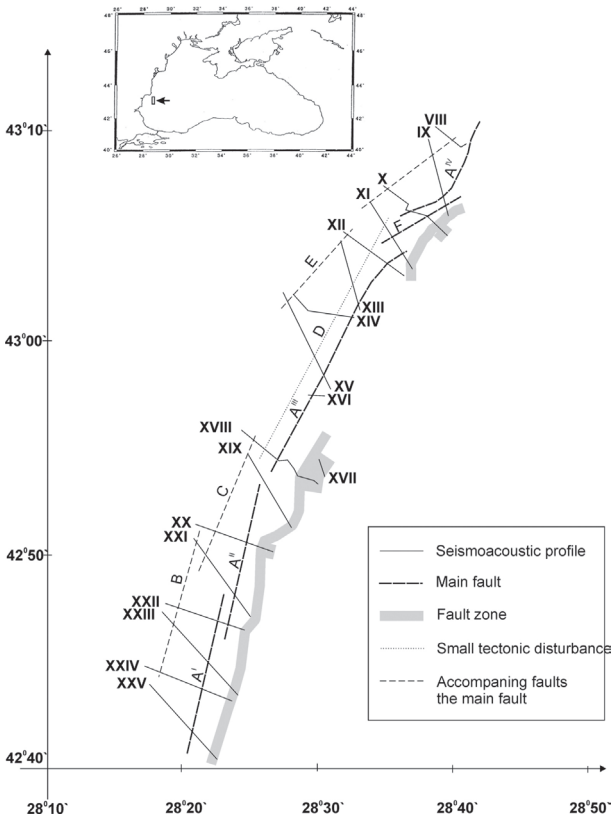


**Fig. 1.** Scheme of the location of trajectories of the seismoacoustic profiles and faults

A typical feature of the fault segments A I, A IV (Fig. 2) is that in the neighbourhood of the profiles do, they reach the sea bottom surface (Fig. 3). On the east of them a fault zone is fixed comprising plenty

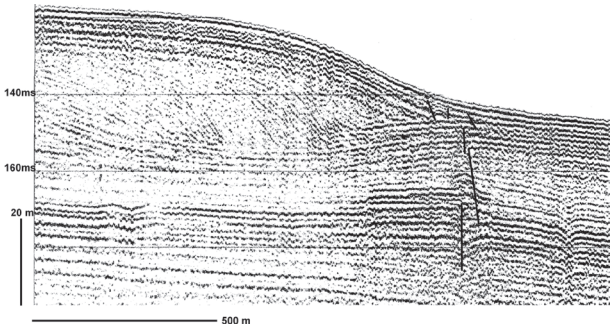


**Fig. 2.** Cross section XVIII and fault surfaces of fault segment $A^{III}$

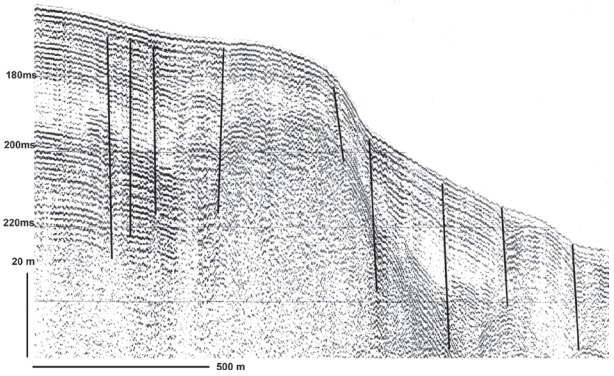


**Fig. 3.** Cross section XVIII and faults belonging to the fault zone

of faults directed north-east south-west. Their number on separate profiles varies from two-three to over ten. All these faults get close to the sea bottom and parts of them appear on its surface. At the west side of the great fault several smaller faults are fixed which trajectories are subparallel to those of the segments comprising it (Fig. 1). At many spots these faults reach the sea bottom surface.

## Conclusions

The analysis of the facts presented here lines in the conclusion that during the Quaternary age there was active breaking process in the area studied.

The epicenters of earthquakes registered close to the studied area and their possible link to the faults whose surfaces reach the sea bottom are indicative of the present activity of these faults.

The submeridian faults defined here are probably a result of stretching tension in the trajectory studied here (Robinson, et al., 1995). The tendency in development of the continental terrace of the Bulgarian part of the Black sea is the stepped submergence in direction to the deep-water kettle over a system of new and renewed submeridian breaks (Kuprin et al., 1980a, 1980b). According to (Mislivets et al., 1980) during the neo-tectonic stage (from the Oligocene until now) the shelf has been submerging relatively less than the continental slope and the continental slope has been submerging relatively less than the continental base. This determines the presence of stretching forces in the area of the shelf edge and the continental slope. Therefore, we could suggest that the fixed faults are gravitational dippers with steep break planes, typical of the areas subjected to stretching. A confirmation of existing conditions of stretching appears to be the presence of ridges, limited by submeridian faults on the west of the area studied.

The transverse driftage – F, cutting through the main submeridian fault at the shelf's edge (Fig. 1) is probably a result of the changing tension in the Earth crust of the Moesian plate, caused by changes in its location to the neighbouring tectonic structures.

Determined location of the EUXBg 05-2 is adjacent to these faults. EUXBg 05-2 is a part of the technical equipment of the project MARINEGEOHAZARD, and the determination his location is a part of the implementation of this project.

All tectonic disorders presented here probably reflect the development of a great fault located deeper.

## References

Gogonenkov, G., Y. Michailov, S. Elmanovich. 1987. *Investigation and Elaboration in the Sphere of Oil Geophysics in the Countries – members of COMECON.* Moscow, 78–89 (in Russian).

Nikolaev, N. I. 1987. *Recent Tectonic and Geodynamics of the Earth Crust.* Moscow, Mir, 491 p. (in Russian).

Shlesinger, A. E. 1998. *Regional Seismic Stratigraphy*. Moscow, Science world, 200 p. (in Russian).

Trabant, P. K. 1993. *Oil and Gas J.*, *93*, 39, 50–56.

Robinson, A., G. Spadini, S. Cloetingh, J. Rudat. 1995. *Marine and Petroleum Geol.*, *12*, 8, 821–835.

Sherif, P., L. Geldart. 1988. *Seismic Studies, b. 2.* Moscow, Mir, 397 p. (in Russian).

Kuprin, P., A. Kalinin, T. Krastev, Y. Morgunov. 1980a. *Geologic and Geophysical Investigations in the Bulgarian Part of Black Sea.* Sofia, BAS, 95–109 (in Russian).

Kuprin, P., A. Kalinin, T. Krastev, Y. Morgunov. 1980b. *Geologic and Geophysical Investigations in the Bulgarian Part of Black Sea.* Sofia, BAS, 124–138 (in Russian).

Mislivets, V., V. Kozlov, T. Krastev, A. Limonov, E. Maev, Y. Morgunov, D. Parlichev, A. Chistyakov. 1980. *Morphostructures and Neotectonics of the Continental Terraces. Geologic and Geophysical Investigations in the Bulgarian Part of Black Sea.* Sofia, BAS, 112–122 (in Russian).