

# SEISMIC ACOUSTIC RESEARCH ON IDENTIFICATION OF ARCHEOLOGICAL SITES IN SUBMERSIBLE ZONES

**Authors:** ANGHEL Sorin, ION Gabriel

**Address:** NATIONAL INSTITUTE OF GEOLOGY AND GEOECOLOGY MARINE – GEOECOMAR; Bucharest; Romania

## **Summary:**

In Romania, geophysical methods are normally used to estimate the distribution of cultural relics, before digging. Objects of archeological interest are usually located within a few meters of the surface. The used equipment belongs to the seismic –acoustic reflexion systems category and it is usually used to detailed investigation of the submersible sediment structure. A great contrast of acoustic impedance and therefore a correct identification of reflecting are also when in the sediment mass there are some bodies with acoustic impedance very different from that of the sediments, like archeological buildings.

## **Introduction:**

Ones of the oldest fortress - type settlements are Greek colonies in Dobrogea, really considered the most ancient cities in Romania(e.g. Argamum,Histria, Tomis and so on). In the last flourished period of the Roman Dobrogea, between 4<sup>th</sup> – 7<sup>th</sup> centuries a. D., the fortifications along the Danube were strengthened, and other fortress were inside built (e.g.Ulmetum,Argamum, Petra). The last fortress is considered the first antique settlement in our country, as it was mentioned by an antic literary source (Barnea 1976).

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Seismic –acoustic research was made with specific equipment (“X-Star Full Spectrum Sub-bottom Profiler”) which works with frequency modulation in the range of 2-16 Hz. The vertical resolution of this system is better than 1 decimeter.

The research has been performed in turbo mode with 12 emission of signal/sec. In order to solve the archeological research objectives (identification of some possible 1 meter width walls).

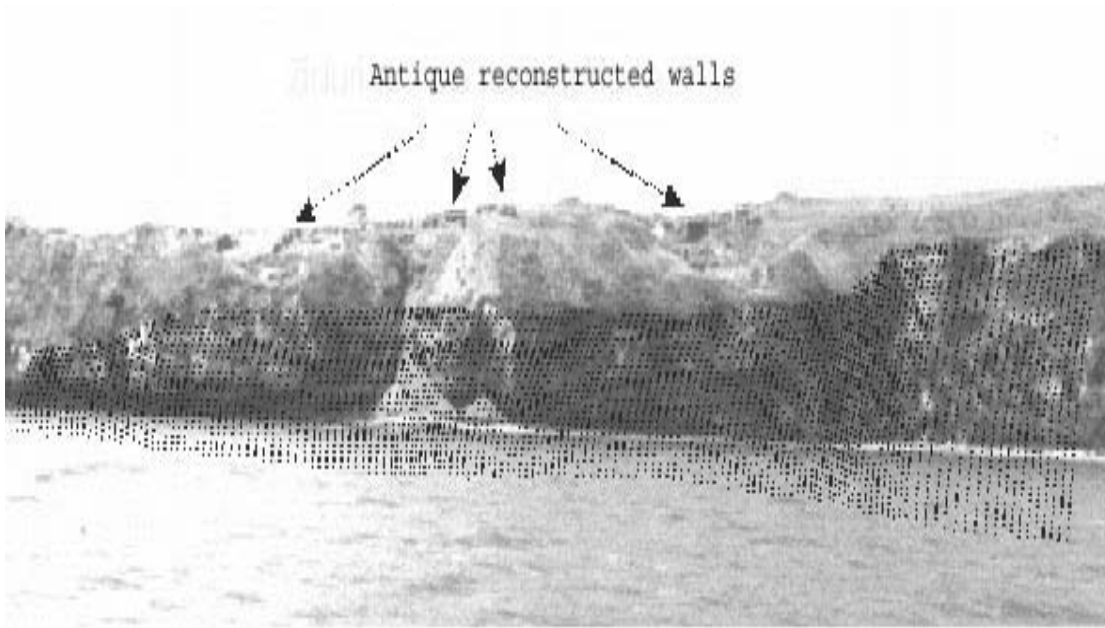
Data have been recorded on thermic paper as depth sections on which the GPS format position information have been noted. The location of works has been noted. The location of works has been performed with a Global Positioning System, Sercel type – NR. 109 GPS.

## **Principle of method**

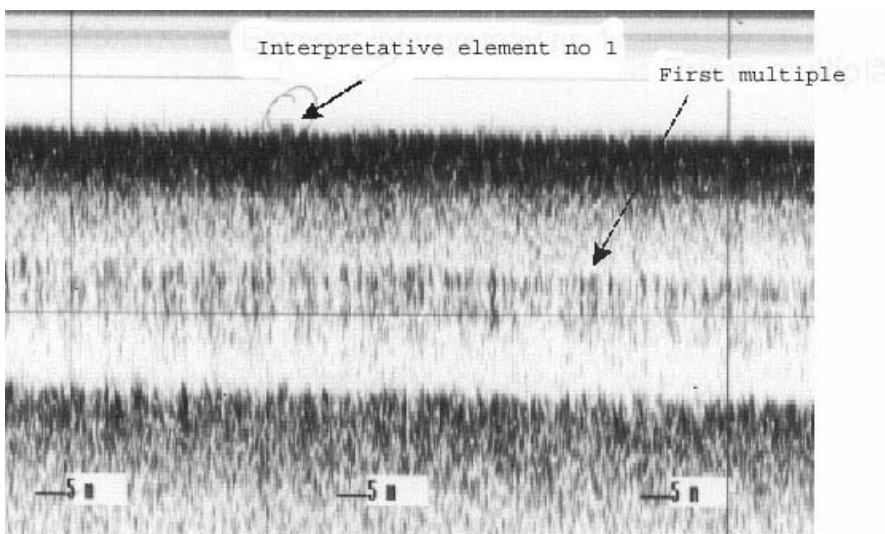
The used equipment belongs to the seismic –acoustic reflexion systems category and it is usually used to detailed investigation of the submersible sediment structure. In a vehicle, pulled by the boat with the collecting data system, there is the seismic source. This produces the mechanical acoustics waives which excite the medium. Besides the source, there are the receptions elements (hydrophones group) which catch the compression waive reflected by the interfaces from the analyzed medium, interfaces which separate domains with deferent acoustics impedances. The cached signal is counted and processed in order to be graphically represented as seismic acoustics sections of reflexion, sections that fallow the structure of the acoustics impedance contrasts of the analyzed medium. The method is based on reflexion capacity of the separation interfaces between different granulometer types which form marine, fluvial and other type sediment mass.

The physical parameters which condition the identification of interfaces in the seismic acoustic sections of reflexion are the contrast of physical properties. This means the speed of the mechanical waives used to excite the sediments, as well as the density of the mass crossed by the mechanical waives produced by the seismic acoustics source.





**Fig.3** The graphic reconstruction paleo-cliff Dolosman



**Fig.4**

A first element isolated on seismic acoustic sections is presented in the **Fig.4** and **Fig.5** ; this elements could represent a part of some antique building which resisted erosion.

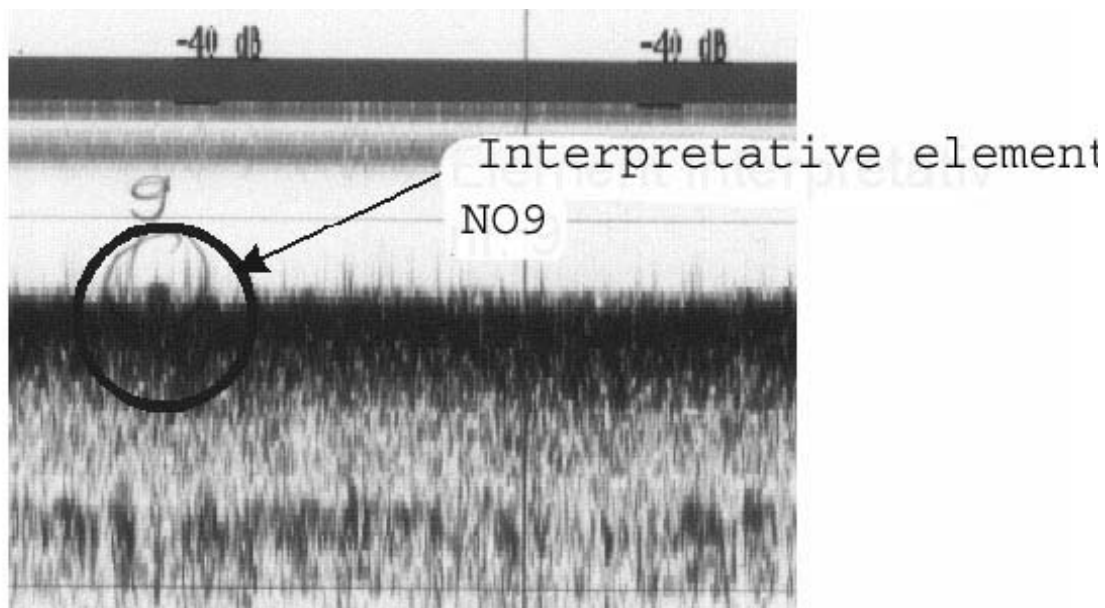


Fig 5.

## Conclusions

The interpretative elements identified on seismic acoustic registered sections can represent parts of small dimensions of some antique buildings which resisted to erosion action, but which don't evidently group themselves in the coherent elements to suggest the presence some antique complexes.

The seismic acoustic works were prospected to make in the form of some almost parallel profiles with coastline in the zone of Argamum fortress, at distance smaller than 10m, in order to find possible antique submersible buildings in the Razelm Lake.

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