ANALELE ŞTIINŢIFICE ALE UNIVERSITĂŢII „AL. I. CUZA" IAŞI
Geologie. Tomul LIII, 2007

THE LITHOLOGIC BASIN COEFFICIENTS FOR CLAYS AND SANDSTONES IN THE FORMATION OF THE BÂRLAD DEPRESSION AND THE SUPERADJACENT FORELAND BASIN

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Abstract

In the present paper, we have determined the lithologic basin coefficients for clays and sandstones in the formation of the Bârlad Depression and the supradjacent foreland basin.

We have made two graphic representation of the porosity with depth variation.

By comparing the coefficients determined to those known in the literature, we have noticed that they are smaller for the foreland basin because the rock is young, Sarmatian and less consolidated, and greater for the Bârlad Depression, with older, more intensely consolidated, Dogger formations (Table 1).

Keywords: clays, sandstones, the lithologic basin coefficients

In order to analyze the subsidence, we use a lithologic basin coefficient for different types of sedimentary rocks. In the specialized literature, the coefficients were determined in different basins and their use in other geological conditions may bring forth errors in the appreciation of the subsidence rhythm.

By using the coefficients determined in the present paper, the degree of correctness in the appreciation of subsidence in this basin increases, and they can be used in other basins with similar geological conditions as well.

Two graphic representations of the porosity with depth variation have been devised as part as this paper, namely Fig. 1 for sandstones and Fig. 2 for clays.

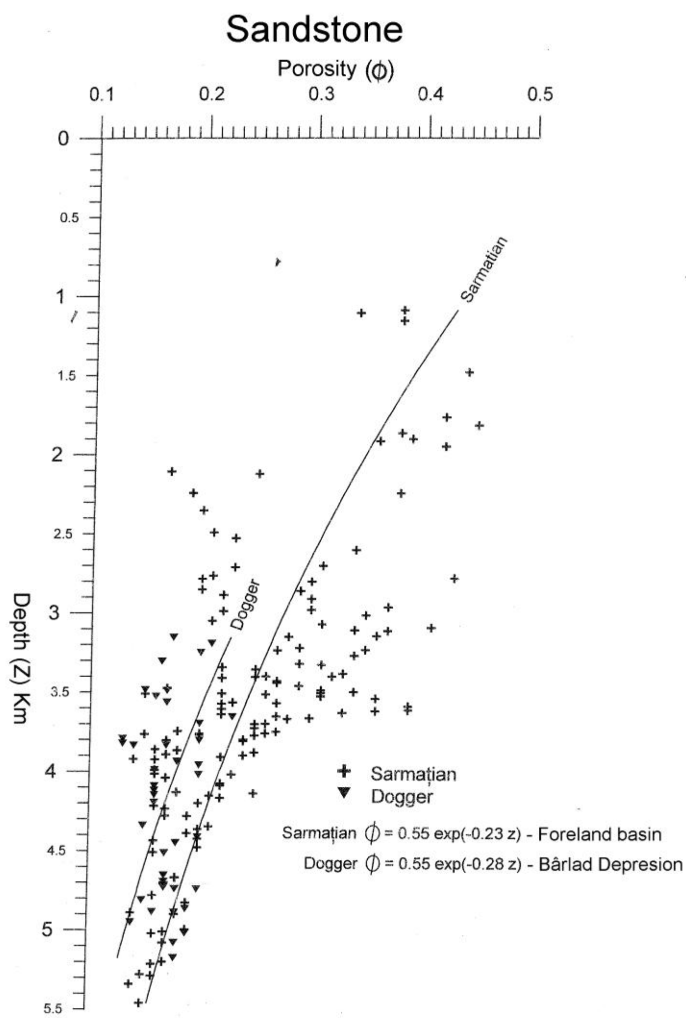

Fig.1. The variation of porosity with depth for sandstones

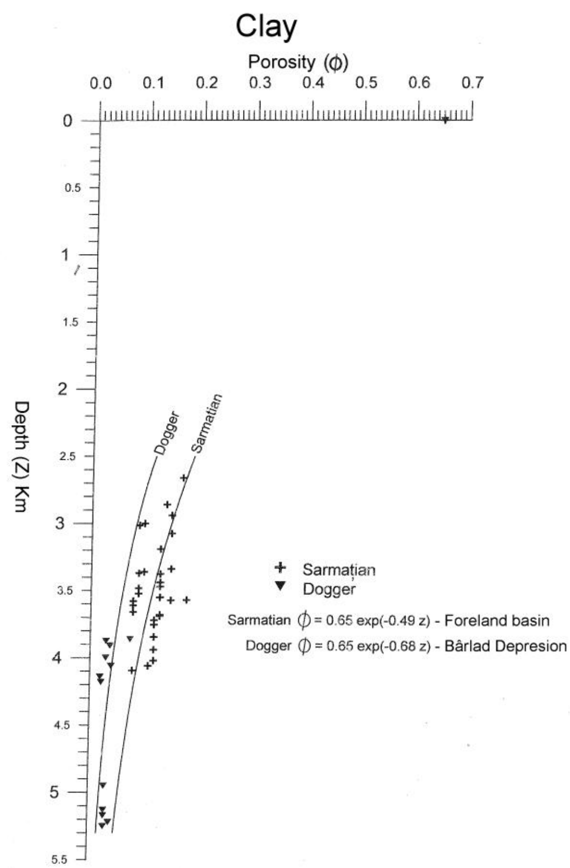

Fig. 2. The variation of porosity with depth for clays

$\phi i = \phi_0 . e^{-cZi}$, ϕ_0 = surface porosity

$\text{Ln } \phi_I = \ln \phi_0 - czi$, ϕ_I, z_i - the porosity at z depth

c = the lithologic basin coefficient, characterized by ϕ_0 and function of rock lithology

As for this area the formations intercepted by the drillings belong to two basins, respectively the East Carpathian foreland of a superior Badenian – Pliocene age and the Birlad Depression, Jurassic and Cretacic in age, but where only the Jurassic is detritic, they have lithologically different compacting degrees for the same type of detritic rock.

For the foreland basin, the marked points belong to the Sarmatian, while, for the Birlad Depression one, they belong to the Dogger.

It is obvious that, on the two graphical representations, the porosity values belong to different fields for both types of rock, each field corresponding to another basin.

Accordingly, for each rock type, clay or sandstone, two curves were traced, one for the Sarmatian of the foreland and the other for the Dogger of the Birlad Depression.

The most used variation relation of porosity with depth is that suggested by Selater and Cristie (1980).

The porosities for different depths were either read on the porosity neutronic diagraphy, or they were determined by using the method introduced by Archie, namely the electric diagraphy of resistivity. The porosity values determined through the resistivity method and the neutronic porosities methods for the same depth and the same lithological type were analyzed in order to see the registered differences, and the latter proved to be insignificant. The greatest differences among determinations appear in the case of unconsolidated rocks at a depth of 1500m, when the porosities are great and variable.

Following the consolidation for the same lithologic and depth type, the porosity values determined through the resistivity method are comparable to those resulted from the neutronic porosity registration.

In one point of the basin, in a drilling hole, the porosity decreases suddenly after a bearing, while passing from foreland formations to those of the Birlad Depression, with a higher compaction degree. The dimension of this bearing depends both on the lithologic type and the sinking depth.

By comparing the coefficients determined in this paper to those known in the literature for the same lithologic type (Table 1), one notices that they are smaller in the case of the foreland basin, for both rock types with younger and less consolidated formations, and greater for those of the Birlad Depression, with older and more intensely consolidated formations.

In conclusion, by using the coefficients determined for this paper in the calculation of subsidence, we shall increase the accuracy of the results given by the previous determinations, which used the same coefficient for both basins and which actually represent, approximately, the mean of the two coefficients determined by us.

Table 1

Rock	ϕ_o	c	ρ_s (Kg/m^3)	Author
Clayish sandstone	0,56	0,39	2720	Allen (1990)
Marly clay	0,55	0,7	2715	Ionescu (1997)
Sarmatian Clay	0,65	0,49		
Dogger Clay	0,65	0,68		
Sarmatian Sandstone	0,55	0,23		
Dogger Sandstone	0,55	0,28		

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